

Contractors and Engineers Monthly

Vol. 44, No. 9

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Covering the Field

Dam Construction

About 5,000,000 cubic yards of earth fill will go into Clearwater Dam (page 1). Unusually heavy grouting is required in the bedrock at Davis Dam. See page 34.

Crushed Rock for Road

The story of grading 12.3 miles of new road and the set-up for crushing base material starts on this page.

Bituminous Paving

Widening and resurfacing with plant-mix has improved an 11.7-mile stretch of U. S. 17 in Georgia. See this page.

A Battle With Snow

A 12-day battle against the worst snow-fall in 57 years is described in an unusual and dramatic style on page 2.

Airport Grading

Grading for a county airport enlargement and a new parkway involves over 3,500,000 cubic yards. See page 5.

Piers Built for Navy

Concrete for the decks of 11 steel and reinforced-concrete piers, 1,845 feet long, was pumped to place. See page 17.

An Effective Safety Program

Relating safety to employees' welfare and interests will help to pep up your safety program, says article on page 22.

Concrete Paving

Truck-mixed concrete was used for widening Georgia road. See page 26. Fighting wet weather on a 9-mile concrete paving job is described on page 36.

Roadside Development

Texas' roadside-development program, planned to provide service and safety, is outlined on page 31.

Irrigation Canals

Adaptation of machines to special job problems featured the excavation and concrete lining of small canals (page 40).

Road Grading

Relocation of a 7.4-mile section of Louisiana highway involved 710,228 cubic yards of excavation. See page 45.

Dogged by bad weather, reconstruction of the old Mormon Trail was rushed to commemorate Utah's centennial (page 65).

Highway Maintenance

That "big business", highway maintenance, and how one well known maintenance engineer handles his problems are covered in a picture story on pages 49-52.

Hydraulic Fill for Levee

The steam-turbine dredge Pontchartrain placed 385,000 yards of hydraulic fill to enlarge an old levee. See page 59.

Soil Conservation

Another in our series on soil conservation and the dirt-moving involved in this essential program appears on page 74.

New Trestle Bridge

A new bridge in South Carolina called for casting and driving 361 reinforced-concrete piles. See page 81.

(You will find "In This Issue" on page 4)

Base Rock Tough To Blast and Crush

Crusher Plant for Hard Sandstone Set Up at Site; Seven Concrete Culvert Structures Part of Job

♦ NATIVES of Beebe, Ark., are a proud lot these days. The reason is "the new road". It is one of the big events of the year for this central Arkansas town. If a traveler will stand still long enough to hear, he can easily get directions.

The subject of conversation is some 12.3 miles of relocation, grading, and placing of crushed-rock traffic-bound base course extending west of Beebe on U. S. 64. F458 (1) is its official code number. Awed as they are by the nice maximum-5-degree curves in the new highway, the local residents are thankful that a long-felt need is finally coming to be realized.

Under a \$328,143 Arkansas State Highway Commission contract, the job has been pushed as rapidly as possible towards completion by the D. F. Jones Construction Co. of Little Rock. The Southeast Construction Co. of Pine Bluff, Ark., subcontracted a part of the grading on the west half of the project, and helped to speed it through.

With the new traffic-bound crushed base now open to traffic, and an additional contract let for bituminous surfacing this year, the new section promises to be one of the most modern main-stem highways in the state.

New Road Design

The new highway is centered in a right-of-way from 120 to 160 feet wide, on a roadbed 40 feet wide at the top of its crushed-rock base. It was built with a compacted-earth subgrade and 7 inches of traffic-bound or compacted crushed-sandstone base. Later, when the bituminous surfacing goes down, it will have a 22-foot surface.

(Continued on page 11)



C. & E. M. Photo

A Lima 1201 dragline equipped with a Hendrix LS-type bucket loads a Euclid with river gravel for the pervious zone in Clearwater Dam.

Rolled Fills Pushed To Erect Huge Dam

Euclid Fleet Gangs Up For Mitty Brothers to Rush Big Flood-Control Dam Towards Completion

♦ MISSOURIANS have a saying that dirt and talk are cheap. Like most sayings, this one has exceptions. A place where dirt is neither cheap nor plentiful is, of all places, at Clearwater Dam in southern Missouri.

An unusual design for its center core features the big flood-control barrier. The design was determined by economy of construction costs, as well as by stability of the section using available materials. The Corps of Engineers at the Little Rock District Office drew up plans calling for a core only 15 feet wide at the dam crest, dropping on a 1 to 1 slope on the upstream edge and a 1 to 1/2 slope on the back. With its base set on natural gravel and rock, this sloping core will have little chance of settlement.

(Continued on page 85)

Plant-Mix Surface For Widened Road

Concrete Road Widened By Two Lime-Rock Strips; Continuous-Mixing Plant Supplies Black-Top

♦ A BUSY stretch of Coastal Highway U. S. 17, or State Route 5, in north-eastern Florida above Jacksonville, was improved last winter. The 11.7-mile widening and surfacing contract began at the Georgia state line and extended south to a point about 4 miles below Yulee in Nassau County.

The 20-year-old concrete pavement was 18 feet wide and much too narrow for the heavy traffic it now carries. It was widened to 24 feet by adding a 3-foot strip of lime-rock base, 10 inches thick, on each side. Following this a bituminous plant-mix surface, varying in thickness from 3/4 to 3 inches, was machine-laid over the entire width.

Just one of the many improvements included in the far-flung highway program of the Peninsula State, this project was awarded by the Florida State Road Department to the Duval Engineering & Contracting Co., of Jacksonville, Fla., on its low bid of \$152,466. The widening got under way the latter part of December, 1946, and was completed in a little over one month.

Lime-Rock Widening Strips

Two Caterpillar No. 12 motor graders dug the widening trenches. The first one went through with its blade set at a 45-degree angle to throw the material from the rough cut it made out on the shoulder. This was followed by the second grader to whose moldboard was attached a special drop blade, 10 inches deep and 3 feet wide, for cutting the trench precisely to the correct dimensions.

Native lime rock, used as a base course in backfilling the trenches, was obtained from deposits in Ocala, Fla., 120 miles to the southwest. It was shipped in gondola cars over the Seaboard Air Line railroad to a siding at Yulee, which had a capacity of 22 cars. A Northwest crane with a 45-foot boom and a Haiss 1-yard clamshell bucket unloaded the cars to trucks, which end-dumped the material along the edge of the pavement, and 17-cubic-yard Euclids which straddled and dumped into the widened strips without stopping. These loaded Euclids were a great help in compacting the dumped strips.

The graders pushed the lime rock into the trench in two courses of 7 1/2 or 8 inches each. Each course was thoroughly rolled so that the total compacted depth of 10 inches was level with the old pavement. As the lime rock was spread in the trench, it was saturated with water by a hose hooked up to a 2,500-gallon tank mounted on a Mack semi-trailer truck. The water flowed

(Continued on page 69)

OCTAGONAL CONCRETE PILES CAST FOR NEW BRIDGE



C. & E. M. Photo

Workmen of the Boney Construction Co. set steel reinforcing cages in wood forms for later pouring of concrete piles. The article on page 81 tells how the piles were cast for a new bridge over the Santee River in South Carolina. A Marion crane and pile-driver rig used on the job works in the background of this picture.

Worst Snowfall in 57 Years Batters State's Road System

A Grim 12-Day Vigil by Equipment Operators and Maintenance Engineers Whips Howling Blizzard

By Raymond P. Day,
Western Editor

CHILL gray dawn broke nervously that Saturday in Denver as early-morning traffic crawled through the streets. Motorists, feeling a vague uneasiness, peered at dull clouds shrouding the high Rockies towards the west. One motorist in particular felt a sharp sense of misgiving.

D. N. Stewart, Superintendent of Maintenance for the Colorado State Highway Department, with three decades of winter-weather experience behind him, studied the thickening clouds. Driving down to the state office building, he perhaps more than many another man in Denver, knew and feared the signs.

When he arrived at his office, Equipment Superintendent F. E. Cummings was already there.

"Well Fred, it looks like we may be in for it," Stewart said, looking towards the window.

"This early, Doug? It's only the second of November."

"I know. You wouldn't think so, would you? But maybe once in 50 years a bad storm is due. I've got a feeling this is the time," Stewart said, settling down heavily in his chair. A ruddy-faced man with iron-gray hair, Stewart typifies the friendly, competent, old-time highway engineer.

Cummings shook his head. "Maybe you're just pessimistic this morning. I hope you're wrong. We're not ready for a big storm. Equipment's old; parts are still hard to get; not many men to go around."

"Look!" Stewart pointed to the window.

Heavy clouds had closed in. The first snowflakes had begun to fall. Almost unconsciously, Stewart studied their eddy on the lee side of the office window. To his experienced mind, the swirl of white gave a clue to wind direction. The angle of flakes farther out told another part of the story.

"Hmm . . . wind's out of the northeast, about 20 miles," he mused. "Temperature's falling. Hell will break loose on the plains before dark. Better call Charlie . . ." and he was reaching for his telephone.

Forewarned by a similar sense of disaster, Assistant Superintendent of Maintenance Charles E. Shumate was in his headquarters at Maintenance Division No. 4 in Pueblo when the phone rang. Big, 6 feet 2 inches tall, 43 years old, and growing bald, with 24 years of service in the Highway Department, Shumate confirmed the worst fears of the older man in Denver.

"It looks bad here, too," he agreed. "I came on down early to get the gang together, just in case."

Briefly describing the severity of the storm breaking on Denver 115 miles to the north of Pueblo, Stewart outlined a tentative program of action. "I haven't got a weather report yet, but it's likely to be bad. Better get your equipment all together and alert all your men. Call me back later."

The Storm Gets Worse

The storm grew thicker. In the afternoon Shumate telephoned to report a contact with the U. S. Weather Bureau

in Pueblo.

"They think it might break up by night, but they left a loophole for themselves that doesn't sound good."

"What's that?"

"They can't tell exactly what's going to happen, Doug. They say conditions all along the eastern slope of the Rocky Mountains make an accurate forecast difficult at this time."

"How far south is the snow falling now?"

"All the way to Trinidad. It started at Pueblo at noon, and is spreading fast."

"Trinidad! Then Stanley Reed is busy already!" With a complete picture of the organization in his mind, Stewart could see Patrolman Stanley Reed at Aguilar, Colo., already hard at it on the 24.3 miles of Highway 85-87 from Trinidad to a point 12 miles south of Walsenburg. He could visualize the entire 700-mile system of Division 4 in which Shumate directed the work of 28 patrolmen, their crews, and equipment.

Shumate was saying, "Stanley's push plows are working right now. And Joe Bowles has started, too, because he's up higher on Raton Pass." Bowles' 14-mile patrol includes the section from

Trinidad south to the New Mexico state line on U. S. 85-87.

"It sounds worse right now than it was all last winter," Stewart replied, worried. "Better have every man and every piece of equipment in your whole district ready to go."

"Surely it won't cover the whole district," the younger man suggested. "If it does, I just don't know how . . ."

"Neither do I," said Stewart.

He didn't dare let himself wonder exactly how serious the situation would become. But a compelling force kept him in his office well after dark that first Saturday. When the telephone jangled insistently at 6 p.m., the storm in Denver showed some signs of abating.

"How does it look now where you are, Charlie?" Stewart asked.

"Worse. The storm has moved south and spread east. Just 30 minutes ago snow was falling better than an inch an hour over 35,000 square miles of the southeastern part of the state!"

Stewart listened intently as Shumate described the scope and severity of the storm. Heavy snow extended from a point due east of Denver, he said, south along the slope of the mountains to the New Mexico and Oklahoma state lines, and east to the Kansas line. Maintenance Division No. 4 was blanketed completely.

"How's the wind and temperature?" Stewart inquired.

"Wind velocity is 45 miles an hour and getting stronger. Air temperature is falling. It's in the upper 20's now, but getting colder every minute."

"Having much real trouble yet?"

The Time Is Now

How early should maintenance forces prepare for snow? Regional climate usually governs this. Still, you never know. Here is a case where the worst storm in 57 years came six weeks before snow was due.

Dramatized from research and from an official report made by Charles E. Shumate to D. N. Stewart, this story is offered by CONTRACTORS AND ENGINEERS MONTHLY as a timely reminder that weather is still unpredictable, and that it is never too early to get ready.

"We may have any time now," Shumate said. "Highway 85 is affected all the way from Denver to the New Mexico line, and . . ."

"Your push plows are keeping it open?"

"Yes, but not on the shoulders."

"Creeping in on you, eh?"

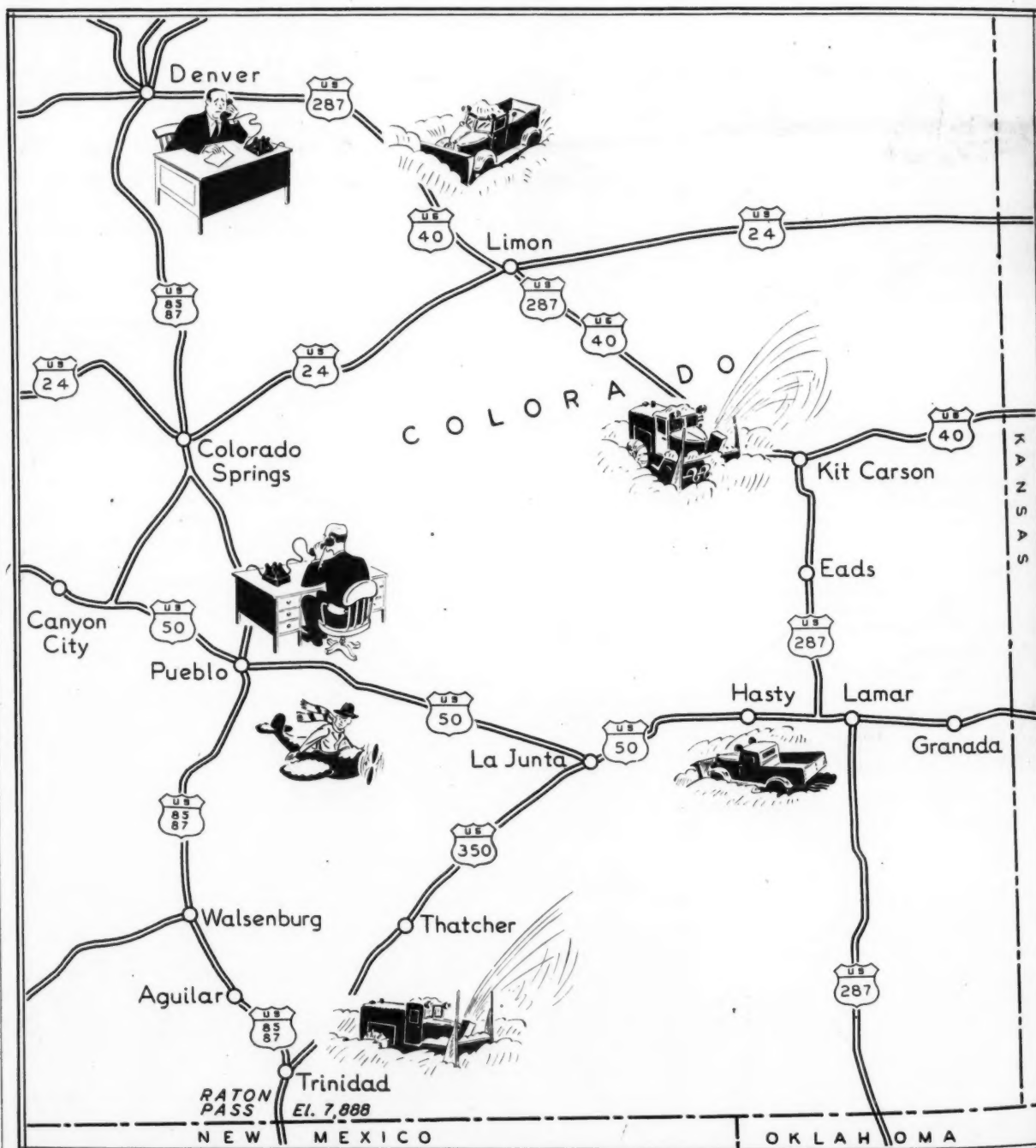
"Yes. Also, U. S. 24 and 40 east of Colorado Springs towards the Kansas state line are beginning to need considerable attention."

"How's 50, and 287 from Kit Carson down to the Oklahoma line?"

"Still clear, but due to give trouble. Hell, Doug, it's taking every piece of equipment we have right now to keep 85, 40, and 24 open!"

Stewart understood. He could picture a dozen situations confronting his

(Continued on page 93)



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needed
resurfacing



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U. S. Route 20 carries heavy traffic across northern Indiana. On a 10-mile section of this important highway near Angola, the concrete pavement no longer provided a smooth-riding surface. The remedy applied by the State of Indiana is the same one successfully employed by many other States for over a quarter of a century. A new wearing surface of resilient, heavy-duty Texaco Asphaltic Concrete has been laid over the existing pavement. This plant-mixed Texaco surface was constructed in two courses, having a combined thickness of three inches.

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Equipment-Conscious

In this mechanical age everyone will agree that the machine is replacing hand labor wherever possible. The construction industry is no exception. Equipment manufacturers are continually developing new tools and machines to do a job better, faster, more efficiently, and more economically than it can be done either by hand or by machines which are already outmoded. This is not news.

What does seem strange, however, is the large number of engineers within the construction industry who are quite unfamiliar with the diverse equipment used in building roads, bridges, dams, levees, and various other civil-engineering structures.

The contractors and their superintendents are usually well informed about all types of equipment used in their particular field. Competition requires that they know just what machine is best suited for the work at hand. But this is not always true of resident engineers and inspectors representing the municipal, county, state, or Federal agency which is directing and paying for the contract.

Their lack of knowledge of equipment and its potentialities is not even considered a shortcoming in their technical education. They may say that they do not care what equipment a contractor employs so long as the requirements of the specifications are met. That is a reasonable but, in the long run, a short-sighted policy. Even worse, they occasionally attempt to specify methods and equipment without the proper fundamental knowledge of the subject.

Obviously, inspectors and engineers can do a better job when they understand fully the many details of the project they are directing. In concerning themselves only with giving line and grade, and seeing that the finished product conforms with the plans and specifications, they are not giving their best to the job or to themselves. With a good working knowledge of materials and equipment, they can view their project with a broader perspective.

Contractors and superintendents are generally only too glad to get opinions or off-the-record advice from veteran engineers regarding the most efficient way of doing a certain job, dispersal of forces, or choice of equipment. Seasoned inspectors who understand what can and cannot be done with the equipment on the job can interpret and carry out the specifications more intelligently. Then too, the men with the broadest all-around knowledge usually are the ones who progress upwards from the ranks of inspectors to the more responsible engineering assignments.

Yet even in some of the top brackets, many engineers fail to realize how important it is to know the types of equipment available for use, and what they

are capable of doing. The recent joint conferences held around the country by highway officials, contractors, and equipment manufacturers have indicated that many highway engineers, particularly in the maintenance category, need to brush up on equipment. Of all engineering personnel the maintenance men should be most equipment-conscious. They buy and use machinery directly and should have the same savvy about its use as would a contractor.

It takes no great amount of study to learn, for instance, the differences among the various types of bituminous distributors on the market, what can be expected of each make, and which is best suited for the operations of any particular highway department or other agency. The technical press, through news items and advertisements, presents the latest developments in construction equipment. Manufacturers are only too happy to respond to inquiries about their products. Also the engineers can learn a lot from the contractors, superintendents, and the men who operate the machines.

The engineer does not have to know how to run a power shovel, motor grader, concrete-finishing machine, or a big self-propelled earth-mover. But if he does possess a fundamental knowl-

edge of how they and other machines are operated and maintained, their capacities, limitations, and other details, he will be the better engineer for all of that.

Practical Objection Raised to Toll Roads

To the Editor,

CONTRACTORS AND ENGINEERS MONTHLY

It is gratifying to observe that through your editorial "Our New Roads—Toll or Free?", in the July issue of CONTRACTORS AND ENGINEERS MONTHLY, the public is given further opportunity to appraise the many and expensive disadvantages of toll roads.

Even though there are a few locations where traffic is forced, by natural obstacles, into controllable channels where toll roads can be operated, the many objectionable features of such financing, which your editorial has enumerated, are recognized by both the Federal and state governments.

To add a very practical objection to the collection of tolls, consideration should be given to the fact that a large portion of total trips are short trips. In eleven states it was found that half the trips made were less than 10 miles in length. This includes both inter-city and intra-city trips. Consider then, the almost impossible condition which would be required in the placing of sufficient toll-collecting facilities to assure that tolls could be collected from any material portion of the users.

Congress has repeatedly demonstrated its disapproval of toll roads by refusing Federal Aid for their construction. It has, however, excepted bridges and approaches operated by a state or its political subdivisions where provision is made to use toll revenue to pay off construction indebtedness.

California legislators, who represent a greater number of highway users than in any other state, were recently asked by a small group to consider toll roads as a partial means of financing a long-range highway-development program. Legislative action resulted in the adoption of a pay-as-you-go program with a tax structure distributed among the various classes of highway users.

Very truly yours,

C. H. Purcell

Director of Public Works

California Department of Public Works

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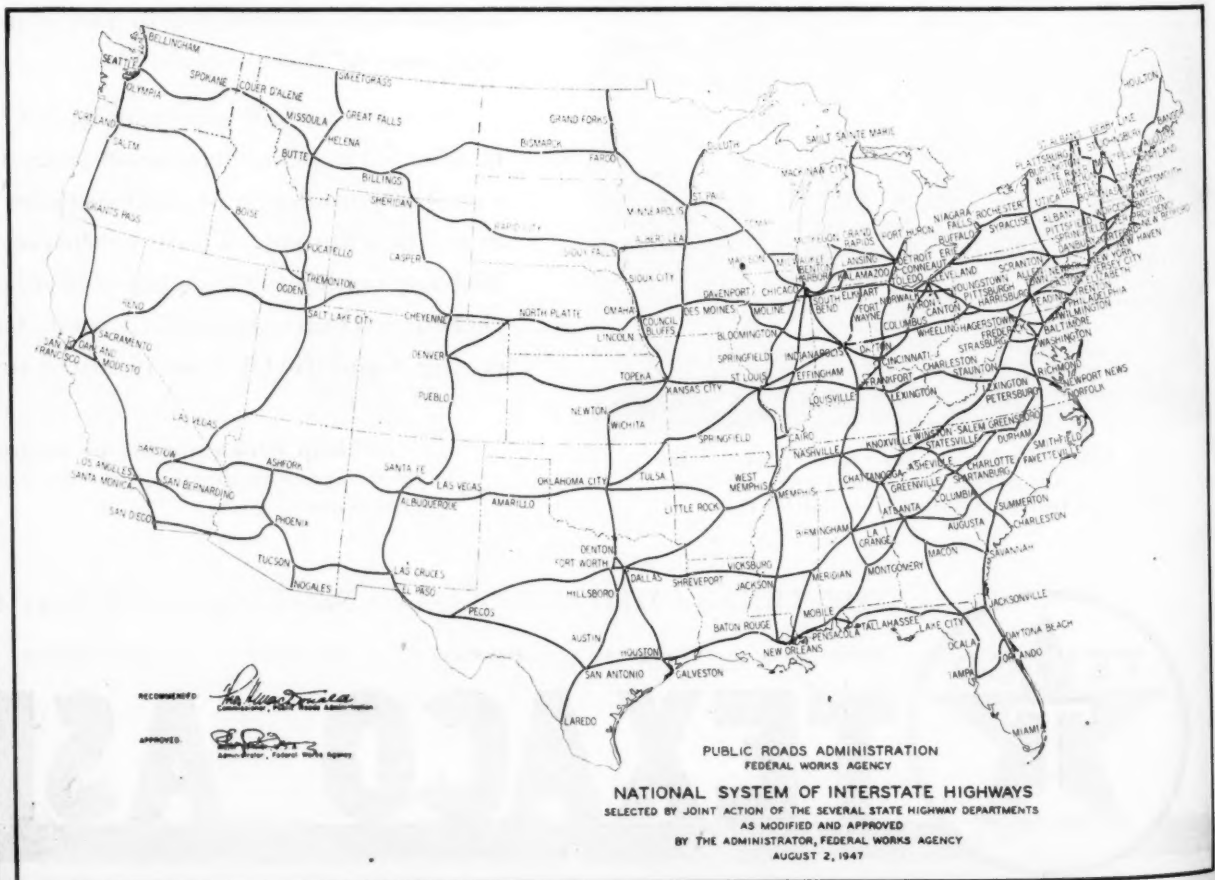
Good Publicity Job On Interstate System

The recent announcement by the Public Roads Administration of the agreed-upon routes for the 37,681-mile Interstate Highway System received a large amount of space in the newspapers of the country. And on a whole, the story seems to have been presented by the press accurately and in detail, though less emphasis on the "super-highway" feature of the system would have been desirable. However, the main point is that the facts have been presented to the public; the reasons for the system; the objectives for its development and improvement; and the benefits to the public.

This kind of dissemination of accurate highway news is essential if we are to have public support for a continuing highway program. The people must be told the hard but realistic truth that highways cost money. But if they are also informed of the plans for highway improvement, and of the advantages to the traveling public of essential highway construction, we believe that full public support of the highway program will be forthcoming.

We congratulate the Public Roads Administration and the American press for their competent job in telling the story of the Interstate Highway System.

Take a minute for safety. It pays!



Airport and Parkway Are Heavy Dirt Jobs

**Two Contractors Handle
Both Projects in Joint
Venture; Over 3,500,000
Yards of Excavation**

By WILLIAM H. QUIRK,
Eastern Editor

♦ DIRT is moving at the Greater Pittsburgh Airport in Allegheny County, Pa. The work will enlarge and improve the present field, and also result in a section of new parkway to provide access to it. Two contractors have merged forces in a joint venture on both of the projects, which include over 3,500,000 yards of excavation. From Milwaukee, Wis., the Frank Mashuda Co. has teamed up with the Harrison Construction Co. of Pittsburgh, Pa., to do the work.

The parkway section, 2.93 miles long, is entirely new location. It extends from the airport to the Cliff Mine-Coraopolis county road. Another section about 2 miles long will be constructed later, under still another contract. It will continue the parkway to an intersection with the William Penn and Lincoln Highways, U. S. 22 and U. S. 30, where both use a common concrete pavement west of Pittsburgh. The parkway will have a 4-lane concrete pavement.

Work at the airport is primarily grading and drainage to enlarge the field around its existing three runways. The area added will be available for the construction of taxiways paralleling the runways; it will also provide space for terminal facilities. The latter will include a loading apron and dock for planes, an administration building, and parking fields for 5,000 automobiles. When the grading is completed, 400 acres will have been added to the original 1,100 acres comprising the field.

Allegheny County is financing and supervising the construction of both airport and parkway. Work on the airport contract started in August, 1946, and was completed in August, 1947, in time for apron and taxiway paving contracts to go forward. In April, 1947, the same contractors began operations on the parkway which is expected to be completed, with paving, by next spring.

The airport grading and drainage work was let in a single contract on a low bid of \$2,499,400. The parkway grading and paving was divided into two adjoining contracts having bid prices of \$486,468 and \$503,508 respectively, or \$989,976 combined. Both projects have a money total of \$3,489,376.

Short History of Airport

Allegheny County acquired the land for the airport site. But the initial construction was performed for the Civil Aeronautics Administration by the Corps of Engineers, Pittsburgh District, back in 1941 and 1942. Three bituminous runways, 150 feet wide, were built. All runways are 5,500 feet long. The present contract also grades the location for a new north-south runway, ultimately to be of comparable length.

The early construction cost around \$5,000,000, and the Army added another \$1,000,000 to this when it set up an Army Transport unit at the field in 1944. This additional sum was chiefly for hangars, apron, and base. The Army still leases the field from the County and uses it for reserve command training.

In 1948 when the present improvements are completed, the Greater Pittsburgh Airport will be used as a commercial as well as a military field. It is located in Moon Township, down the Ohio, about 12 air-line miles west of

the point of Pittsburgh's Golden Triangle. At present the site can be reached only over traffic-clogged streets and roads near the city, and farther out in the country over tortuous, narrow, winding, hilly roads. The new Airport Parkway will be the first step in providing quick and convenient access to the big field.

The Pennsylvania Department of Highways has a program for constructing a new Penn-Lincoln Parkway on an east-west line through the city of Pittsburgh; it will cross the Monongahela River on either a new bridge or a new deck added to the Point Bridge. This proposed parkway will then tie in to the present U. S. 22 and U. S. 30 where the new Airport Parkway takes off. A cloverleaf system of interchanging



C. & E. M. Photo

Two LeTourneau LP 12 to 15-yard scrapers pulled by Caterpillar D8's load downhill in a 64-foot cut on the Airport Parkway section. A D8 pusher helps the unit at left. On the far right a LeTourneau Rooter pulled by a D8 is ripping into the shale.

traffic will be built at this point. When this highway scheme is realized, the airport can then be reached from downtown Pittsburgh in a short time.

Commercial planes for Pittsburgh now use the County's other field in West Mifflin Township, known as the Municipal Airport. The fact that this field lacks the room necessary for ex-

pansion was a factor in acquiring a new site.

Heavy Grading Job

When the contractors began operations they found two large hills on the site which were about 75 feet above the required grade. Airport grade, inci-

(Continued on next page)



TL-20 Mobility pays off both in crowded city and wide open spaces

• What does "crane mobility" mean to you? The ability to "shoe horn" a crane under its own power through a crowded city street or to travel many miles over mountain trails? TL-20 owners are doing both to cover jobs with these light-footed, rubber-tire mounted units.

The two top illustrations show TL-20's at work on New York City subway construction. The lower picture, in direct contrast, shows a similar unit of the Colorado State Game and Fish Dept. digging a fish pond.

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Airport and Parkway Are Heavy Dirt Jobs

(Continued from preceding page)

dently, is 540 feet higher than the pool level at Pittsburgh which normally is 710 elevation. While listed in the contract as unclassified, the 3,200,000 yards of excavation included shale, limestone, and sandstone in generous amounts. The contractor also removed 4,000 yards of bituminous or soft coal—a common-enough occurrence when doing any digging in this coal-field region.

Another excavation item in the contract was a \$50,000 sum for moving about 350 graves in two cemeteries. This was all hand work since each set of bones had to be cataloged and transferred to another site 1½ miles away. New plots had to be laid out and the old monuments also had to be moved and erected over the fresh graves.

But in the main, the earth work was handled by a big fleet of excavating and earth-moving equipment which was supplied by both contractors. No borrow was required, as the hills contained enough material to grade the site as they were leveled off. Where rock was indicated, the overburden was first removed by scrapers, either tractor-drawn or self-propelled units. These scrapers also handled most of the dirt and light shale. The tractor-drawn scrapers were used on hauls up to 900 feet and included seven LeTourneau units all pulled by Caterpillar D8 tractors. Of these six were RU 22-yard scrapers while the seventh was an LP 12-yard model. On the longer hauls up to a mile (the average was 2,000 feet) four Tournapulls with 12-yard Carryalls were employed.

Rock Work

For the rock removal, which was mostly limestone, blast holes were drilled with three horizontal drills: a Parmanco 5-inch, a McCarthy 6-inch, and a Hardsocg 6-inch drill. A maximum vertical face of 30 feet was worked in the rock, as up to this height was considered the most efficient for the shovels used. The holes were drilled from 60 to 72 feet long on the average, with a spacing from 8 to 16 feet on centers along the bottom of the face. According to the hardness of the rock



C. & E. M. Photo

A concrete cradle is poured for 36-inch concrete-pipe culvert at Allegheny Airport. A Rex 3-yard mixer on an International truck chutes concrete into the forms. A Novo pump (left foreground) keeps the excavation dry, while a Jaeger pump (at the right) stands by in case of heavy rain.

encountered, from 20 minutes to an hour was required to drill one hole.

Auger sections 6 feet long were employed, and from one to three bits were

needed per hole. From 5 to 12 holes were opened up and shot at a time, the average charges ranging from ½ to 3 tons of dynamite at one blast. Atlas and American Cyanamid 40 per cent dynamite was used, the cartridges being 5 inches in diameter and 25 inches long.

A battery of nine shovels was available for heavy excavation on the project. Included were three Bucyrus-Erie units—a 10B ¾-yard, a 2-yard 43, and a 2½-yard 48; four Lorains—two 2-yard 80's, a 2-yard 82, and a 2¼-yard 820; a Lima 3-yard; and a Northwest 2½-yard. Material was loaded into 5 White trucks averaging 10-yard capacities, and 28 Euclids. Of the latter 6 were bottom-dumps carrying 14 yards struck, and the remaining 22 were end-dumps of 9-yard struck capacity. The average rock haul with these units was around 2,000 feet.

Little secondary blasting was done. The larger rocks were placed on the fill and broken up with 2-ton steel rock busters swung from crane booms. Four

(Continued on next page)

Here's the answer

to All your aggregate producing problems



the Cedarapids Unitized Plant

One to six different sizes of finished products in one operation! 25 to 250 tons per hour or even more! That's the kind of production you get from a Cedarapids Unitized Plant.

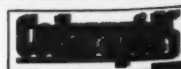
Four basic units make up a complete Unitized Plant: (1) a portable primary jaw crusher; (2) a scalping unit consisting of a jaw crusher and vibrating screen; (3) a secondary unit consisting of a vibrating screen and a roll crusher, hammer-mill, twin jaw crusher or cone crusher; and (4) a wet or dry screening unit. These four units may be used in any combination depending upon the pit or quarry conditions and the finished

products desired. For example, a primary and a hammermill secondary in a limestone quarry will produce roadstone and agricultural limestone. A scalping unit and a roll crusher secondary will produce crushed gravel in a pit where oversize is relatively small. A dozen other combinations can be set up for producing aggregate that will meet any specifications. A wide range of sizes of each unit makes it possible to have a plant with almost any desired capacity.

When you buy a crushing plant—buy the best—buy Cedarapids. Ask your nearest Cedarapids dealer for details on the Unitized Plant.

Iowa Manufacturing Company, Cedar Rapids, Iowa, U. S. A.

PRODUCT OF



The Iowa Line of Material Handling Equipment Includes

ROCK AND GRAVEL CRUSHERS
BELT CONVEYORS—STEEL BINS
BUCKET ELEVATORS
VIBRATOR AND REVOLVING SCREENS

STRAIGHT LINE ROCK AND GRAVEL PLANTS
FEEDERS—TRAPS
PORTABLE POWER CONVEYORS
KUBIT IMPACT BREAKERS

DRAG SCRAPER TANKS
WASHING PLANTS
TRACTOR-CRUSHER PLANTS
STEEL TRUCKS AND TRAILERS

PORTABLE STONE PLANTS
PORTABLE GRAVEL PLANTS
REDUCTION CRUSHERS
BATCH TYPE ASPHALT PLANTS

Portable
Self-erecting
Self-powered

MATERIAL ELEVATOR

stands 47 feet high

• Move it anywhere . . . then start the hoist engine, let it raise the sturdy, welded tower . . . and you're ready to lift brick, mortar, and other materials at minimum cost. Platform travel is 40 feet, at a speed of 87 feet per minute. Write for illustrated literature.

**American Hoist
and DERRICK COMPANY**
St. Paul 1, Minnesota

Airport and Parkway Are Heavy Dirt Jobs

(Continued from preceding page)

cranes worked over the site doing this crushing; they included three Lorains and a Koehring, all with 30-foot booms.

Compacted Fills

In enlarging the field around the existing runways, 50 to 60-foot fills were built up to grade, placed in 9-inch lifts, each of which was compacted with six passes of a sheepsfoot roller. For spreading the material, 9 tractor-dozers were kept on the fill, including 6 D8's and 3 D7's. Three triple-drum and two double-drum LaPlant-Choate sheepsfoot rollers were available for the compaction and were usually pulled by one of the D8 tractors.

Last year three sprinkler trucks were kept busy wetting down the material as it was placed on the fill in order to get maximum density at the optimum moisture content. Because of the wet spring and summer this year, little use was made of the sprinklers.

Rounding out the earth-moving equipment were two D8 pushers to assist the scrapers in loading. Two Caterpillar No. 12 motor graders shaped up the grade and also kept the haul roads in good condition.

Two shifts a day, 5 days a week, were worked on the airport construction. The day shift ran from 7 a. m. to 4:30 p. m., while the night crew came on at 7 p. m. and stayed until 4 a. m. the next morning. No drilling of rock or earth-moving by scrapers was done in the night shift, but otherwise the day and night work was similar.

To light the operations seven Onan 5-kw light plants were used. They consisted of steel towers mounted on skids which were easily moved around the site by tractor. From 16,000 to 20,000 yards of material was moved at the airport during a two-shift day. The major items in this contract included:

Excavation	3,200,000 cu. yds.
Concrete for pipe cradles	680 cu. yds.
Reinforced-concrete pipe culverts, 18 to 54-inch	1,960 lin. ft.
Clay-pipe underdrain, 6 and 8-inch	7,000 lin. ft.

For the contractors the Day Superintendent was Victor Mashuda, and the Night Superintendent was Tony Kozlowski.

Parkway Grading

The nearly 3-mile-long parkway grading job is uphill all the way to the airport, with a maximum grade of 3 per cent. One of the first operations was the building of three large reinforced-concrete culverts—two 10 x 10-foot ones, 70 and 115 feet long respectively, and a 10 x 8-foot which is 180 feet long. The channel of a meandering stream also had to be changed to keep it on one side of the new road as much as possible. Besides the poured drainage structures, over 7,000 linear feet of



C. & E. M. Photo

Heavy rains have halted Allegheny Airport work for the day. Part of the fleet of end-dump Euclids and White trucks is drawn up in the foreground, near a Lorain shovel which had been working in a cut. This photo looks southeast across the airport.

reinforced-concrete pipe also was laid for culverts ranging in diameter from 15 to 84 inches.

As much of this pipe was laid in swampy areas, a D8 tractor equipped with a 25-foot welded-pipe A-frame handled the sections by pipe hook and cable, setting them in the trench. On firmer ground a Lorain 40 Moto-Crane laid the pipe. This unit with a 3/4-yard

clamshell bucket was also used for ditch excavation. A Northwest 3/4-yard dragline dug the channel for the stream change, 12 feet wide at the bottom with 1 1/2 to 1 side slopes.

When pipe was laid through fills over 12 feet high, the lower half of the pipe was encased in a concrete cradle 12 inches thick below the pipe and about 6 inches at the sides. Forms for the

cradle consisted of 1-inch lumber backed with 2 x 4 studs on 16-inch centers and a 2 x 6 wale running along the footing. The pipe sections were placed on 12 x 12 x 6-inch concrete blocks to raise them off the ground, permitting the concrete to fill up the form both beneath and at the sides of the pipe. Slag was used to adjust the blocks to the proper grade.

The Boyd Lumber Co. of Coraopolis, Pa., supplied ready-mixed concrete for the drainage structures. It delivered the material in truck-mixers after a 6-mile haul to the site. The Universal Concrete Pipe Co. of Pittsburgh furnished the pipe.

The trees on the right-of-way were felled by hand, but most of the grubbing and brush work was handled by a D8 equipped with a special contractor-made attachment. This was a dozer blade built like a rake which was effective in heavy undergrowth. The dirt sifted through the openings while the brush was lifted out and moved along.

(Continued on next page)

TO BEAT YOUR ESTIMATE WHEN THE GOING GETS TOUGH



Two Ransome 34E Single Drum Pavers, owned by J. A. Utley Company, Michigan contractor, delivering concrete directly into forms

Concrete for this big Michigan auto factory site was batched at a central mixing plant. Ground conditions kept truck mixers from getting close to the forms. Bridging the gap with crane-carried buckets would have shot costs up far beyond the estimate. So . . .

Ransome Blue Brute Pavers were called in. From well back of the excavated dirt mounds their "live booms" swung their hydraulically-controlled buckets directly over the forms. Spillage was eliminated by the bucket's hydraulic shut-off when the forms were filled . . . Another construction problem solved!

More About the "Live Boom"

It spreads over a wider area with every swing, eliminating hand shoveling . . . Boom can be elevated to 9-ft.

clearance under bucket, while paver concretes retaining walls, etc., and lays the slab—all in one operation. Only Ransome Pavers include the "live boom" as standard equipment.

Get the Whole Story

Many other advanced features show why 34E's—Single Drum and Dual Drum—are preferred equipment on big construction jobs . . . highways, dams, reservoirs, airport runways, foundations, piers . . . saving costs with every cubic foot of concrete placed. Write for facts on how these famous Ransome Pavers can make more profits for you with their high-speed operation and their low maintenance cost . . . proving there's more worth in a Blue Brute. 10-3

KNOW YOUR

BLUE BRUTES

Your Blue Brute Distributor will be glad to show you how Worthington-Ransome construction equipment will put your planning on a profitable basis.

RANSOME EQUIPMENT

Pavers, Portable and Stationary Mixers, Truck Mixers, Pneumatic Placing and Grouting Equipment and Accessories.

WORTHINGTON EQUIPMENT

Gasoline and Diesel Driven Portable Compressors, Rock Drills, Air Tools, Self-Priming Centrifugal Pumps and Accessories.

WORTHINGTON



Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Mass.

CANEDY-OTTO DRILL PRESSES

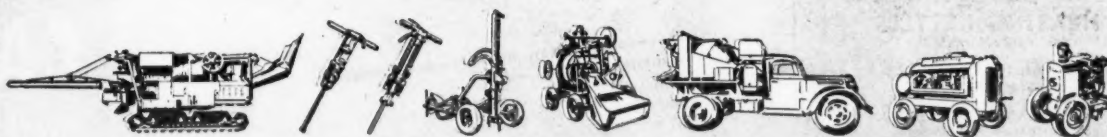
1/2" SPEED — 21" STATIONARY HEAD SINGLE SPINDLE FLOOR DRILL — 1 1/2" CAPACITY

The ideal general purpose drill, equipped with back gear and power feed, ratchet type lever feed, wheel feed and automatic stop. 8 Spindle speeds and 3 rates of power feed. Available with either tight and loose pulley drive for countershaft power take-off, or electric Vee belt, or geared motor drive. Capable of close, precision drilling. Rugged one-piece semi cast steel construction. Accurately machined table and base. Table pivots, swings 360° around column. Write for full details.



CANEDY-OTTO MFG. CO.
Chicago Heights 1, Ill.

BUY BLUE BRUTES



IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB

Airport and Parkway Are Heavy Dirt Jobs

(Continued from preceding page)

Dirt on the parkway in the preliminary stages was moved by four Le-Tourneau scrapers—two RU 22-yard models and two LP 12-yard models—and two LaPlant-Choate 25-yard units. All scrapers were pulled by D8 tractors, while another D8 pusher tractor helped with the loading which followed a downhill pattern over most of the job. When shale was encountered a Le-Tourneau Rooter pulled by a D8 broke it up for the scrapers. Other equipment used later included a Lorain 80 dragline, a Lorain 82 2-cubic-yard shovel, and two Bucyrus-Erie 2-yard shovels.

Dirt on the fills was placed in 8-inch layers and compacted by sheepfoot rollers. When rock was reached after the overburden was removed by the tractor-drawn scrapers, the rock-excavating equipment was moved down from the airport site to work on the parkway. The rock was laid in 10-inch lifts. Haul lengths ranged from 1,200 to 3,000 feet. Both cut and fill slopes are 1½ to 1, and were graded by an Adams No. 1 pulled grader behind a D3 tractor. Only one shift was worked on the parkway, and the above equipment moved an average of 1,800 yards of dirt in an 8-hour day. That average was later stepped up to 4,600 yards a day.

When completed, the parkway will have an 80-foot roadbed consisting of two 25-foot lanes of concrete separated by a 4-foot divisor strip. This divisor is to be made up of two concrete curbs within which will be a 2½-foot strip of sidewalk pavement. The inner slabs of concrete paving are to be 13 feet wide and the outer slabs will be 12 feet from which 13-foot shoulders will run out. The pavement will be plain concrete, 10 inches thick.

At the lower end for a stretch of nearly 800 feet, the pavement will consist of an 8-inch waterbound-macadam base course topped by a 2-inch asphaltic surface. At some future date this will be removed when a grade-separation structure is erected at the Cliff Mine-Coraopolis road intersection.

The combined major items on the two parkway contracts include:

Excavation	350,000 cu. yds.
Concrete for structures	1,274 cu. yds.
Concrete, 10-inch pavement	69,500 sq. yds.
Reinforced-concrete pipe culverts, 15 to 84-inch	7,056 lin. ft.
Steel reinforcement	250,000 lbs.
Macadam pavement	6,900 sq. yds.



C. & E. M. Photo

The maintenance shop of the Harrison Construction Co. is made of a steel framework with corrugated-metal roof and sides and a concrete foundation floor. The second floor at the rear end provides office space.

Equipment Maintenance

Each of the two contractors erected a shop at the airport site for the maintenance of equipment. The shop of the Harrison Construction Co. is 110 feet long x 35 feet wide. It is made of a steel framework with corrugated-metal roof and sides and a concrete founda-

tion floor. At one side a second floor is built in to provide office space. Windows around the sides supply natural lighting, while electric lights hang from the roof and are fastened to the rear wall over eight metal workbenches, 6 feet long x 30 inches wide. In cabinets under these benches the mechanics

keep their personal tools.

The front wall of the shop has 5 large sliding doors, 12 feet wide x 14 feet high, through which the large equipment can easily pass. Hung from the steel trusses overhead are rail beams on which rides a Yale 5-ton hoist which can be spotted over any place on the floor. Underneath the second-floor office is a stock room with wooden bins and shelves, enclosed by a wire fence. Welding is also done at this end of the shop either on oxyacetylene sets or by a Westinghouse Flex Arc 400-amp electric welder which is truck-mounted so that it may be taken out in the field if necessary.

Other shop equipment includes an Ingersoll-Rand compressor to supply the shop with compressed air; a Trojan battery charger that can charge 12 batteries at a time; a Black & Decker valve-refacing machine; a 20-ton hydraulic press; and numerous small tools and vises. Rebuilding motors is one of the routine tasks performed at the shop.

(Concluded on next page, Col. 2)

USERS REPORT ON THE "CATERPILLAR" BULLDOZER



IT'S A HIT! NO ADDITION TO THE "CATERPILLAR" LINE HAS WON HIGHER PRAISE THAN THE NEW "CATERPILLAR" BULLDOZER. HERE ARE A FEW SAMPLES OF THE WAY USERS FEEL ABOUT IT:

From Walter O'Neill, contractor, Havre, Montana
"Unquestionably it's the best and last word in 'dozers'. The ability to tilt the blade enables doing lots of work that would previously have required an angledozer. We moved 9000 cubic yards in 5 days this past week. This 'dozer beats any we know of.'"

From Harry Sanders, D7 operator, Conn.
"With the D7 and the 'Caterpillar' Bulldozer blade I can walk these 2-foot stumps right out of the ground."

From S. T. Lambeth, Greensboro, N. C.
"Best darn 'dozer I've ever owned or seen operated. Visibility is perfect; blade extremely rugged and durable; dirt seems to roll from the blade instead of sticking to it; blade reacts very quickly to the controls and it will dig harder material than any other 'dozer of comparable size on the market.'"

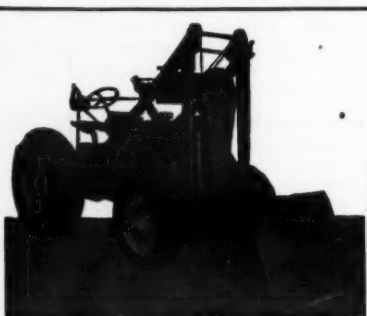
From John Gaston, Main Roads Commission, Queensland, Australia
"I think the 'Caterpillar' 'dozer is the best and most easily controlled of any I have handled. Driving a D7 with 'Caterpillar' 'dozer attached, I loaded 1980 yards of earth in 8½ hours."

From M. M. Whilden, contractor, Dallas, Texas
"I've made no adjustments to this unit in 3 months, where formerly on other equipment adjustment was necessary every day."

From Jim Calas, farm contractor, Lakeview, Oregon
"Since running it a month, am more glad than ever I waited. It does everything a fellow could ask. The 'dozer handles nice and easy and accurate."

From R. H. Byles, lumberman, Fresno, Calif.
"This outfit is rugged. It's the best dirt-moving 'dozer I've seen."

CATERPILLAR
REG. U. S. PAT. OFF.
DIESEL ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT



FRONT END LOADERS

for Industrial Tractors

Extensible Booms—8' lift
½ and ⅝ cu. yd. capacity.

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Gasoline Engine and
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HEATING KETTLES

for Asphalt and Tar

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Portable—Stationary
Write for Circulars

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INDIANA

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS



This canvas water bag made by H. Wenzel Tent & Duck Co. has a shoulder harness and apron which straps to the back of the carrier, leaving both his hands free for climbing ladders, etc.

Canvas Water Bag

A large-size canvas water bag is made by the H. Wenzel Tent & Duck Co., 1037 Paul St., St. Louis 4, Mo. Called the Water Boy, it has a complete shoulder harness and apron which straps to the back of the carrier; this enables him to climb ladders and reach other places requiring the use of two hands.

Made of heavy canvas, it allows water to seep slowly through and be evaporated by the air. This construction keeps the drinking water inside the bag cool and fresh, the manufacturer points out. The bag is equipped with a sanitary chrome spigot at the bottom which can be used either as a faucet or turned up and used as a bubbling fountain. Capacity of the bag is 5 gallons.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 8.

Machines for Shop Use

A pocket-size catalog on machine tools for working metal, wood, or plastic has been put out by the Walker-Turner Co., Inc., Plainfield, N. J. Drill presses, band saws, radial saws and drills, grinders, tilting arbor saws, jointers, lathes, and other machines are described in Catalog No. 1006. It gives their features, the sizes in which they are made, prices, and other relevant information.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 53.

DURBIN-DURCO, Inc.

Manufacturers Certified Specialty Products
Malleable Iron • Drop-Forged • Steel

LOAD BINDER — MALLEABLE IRON

Heat Treated • 5 Sizes

With New, Improved, Reinforced
Non-Spreading Mouth



Pat. Pending

MIDGET No. 1— $\frac{1}{4}$ " chain	Wt. Each
DELTA No. 1— $\frac{1}{2}$ " or $\frac{3}{4}$ " chain	2 $\frac{1}{2}$ lbs.
	6 $\frac{1}{2}$ lbs.
Two Swivels	Wt. Each
DIXIE No. 1— $\frac{1}{4}$ " or $\frac{1}{2}$ " chain	10 lbs.
LONE STAR 1— $\frac{1}{4}$ " or $\frac{1}{2}$ " chain	14 lbs.
LONE STAR 2— $\frac{1}{4}$ " or $\frac{1}{2}$ " chain	17 lbs.

LOAD BINDER — DROP-FORGED

Heat Treated • 2 Sizes



Two Swivels

Durbin-Boomer F-1—for $\frac{3}{4}$ " chain	10 lbs.
Durbin-Boomer F-2—for $\frac{1}{2}$ " or $\frac{3}{4}$ " chain	12 lbs.

Other Durbin-Durco Products

COMBINATION ROPE HOIST AND
WIRE STRETCHER • Extra Heavy Duty

ALL-STEEL ROLLER BEARING, ROPE HOIST

WOVEN WIRE FENCE STRETCHER
Lever Action, Double Ratchet, Also Worm Gear Type

WRITE FOR CATALOG • Dept. CEM

DURBIN-DURCO, Inc.
6611 Olive St. Road • St. Louis 5, Mo.

Airport and Parkway Are Heavy Dirt Jobs

(Continued from preceding page)

Gene Julian is Master Mechanic supervising equipment maintenance for the Harrison Construction Co.

The Frank Mashuda Co. set up a 40 x 100-foot Quonset hut on a 12-inch concrete foundation for use as a shop. Each end of the 20-foot-high metal structure has a 15-foot-square sliding door. On each side are eight windows while electric lights are suspended from the ribs in the roof. Two large coal-burning stoves heated the hut in the winter. The mechanics work at metal workbenches and keep their tools locked in cabinets when not in use.

Equipment is lifted by a hoist frame equipped with a 3-ton chain block. Batteries are charged on either a Heyer or a Goodyear charger. This shop also has a Black & Decker valve refacer. Welding is done on a Hobart electric welder, truck-mounted so that it may

quickly be run out in the field if necessary.

Equipment parts and supplies are stored in four trailers lined up at the side of the shop. These box-like structures are 36 feet long x 8 feet wide x 7 feet high and are mounted on Mack trailer trucks when being moved from job to job. On the job site they are set on a timber-crib foundation to release the trailers for other work. Ed Mashuda is the Master Mechanic at this shop.

While each contractor maintains his own equipment, every other phase of the work is performed as a single unit with one purchasing agent doing all the buying and one general superintendent supervising the project.

Most of the equipment is diesel-powered, using Gulf fuel which is stored at the site in three 3,000-gallon tanks. Service trucks fill up there and then go out over the job to refuel the various pieces of equipment. Other service trucks grease the units in the field making certain that the tractors

and scrapers are lubricated right on the job. If all the trucks are not reached in the day, they are run into the shops and greased at night on a rack at the side of the shop which is illuminated by floodlights.

Personnel

The number of employees on both the airport and parkway contracts averages between 200 and 225. Walter Yoakum is General Superintendent and H. S. Shepard is Engineer for Harrison-Mashuda.

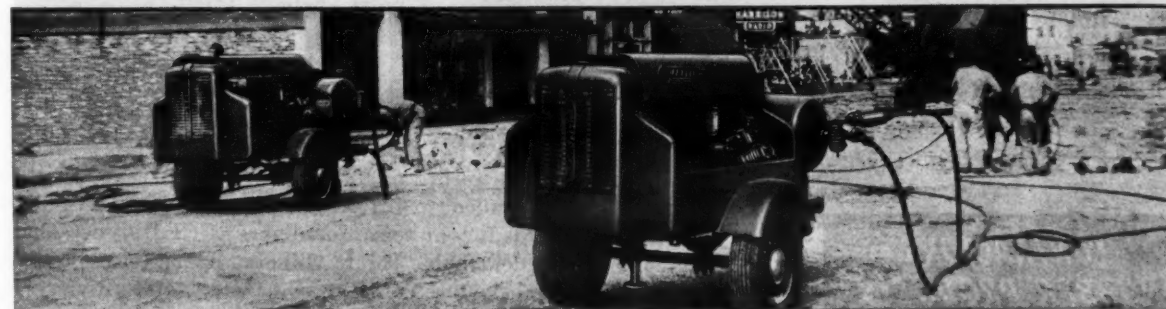
This work is being done by the Board of County Commissioners of Allegheny County, which is composed of John J. Kane, Chairman; George Rankin, Jr.; John S. Herron; and Robert G. Woodside, Controller. John B. Sweeney is Director of Aviation; E. G. Messner, Chief Engineer; Col. Theo. Eichholz, Supervising Architect; Wilber A. Sheets, Airport Design Engineer; and J. Robert Proctor, Construction Engineer. H. P. McKown is Resident Engineer for the County.



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FORCE-FEED LUBRICATION + SLOWER, COOLER PISTON SPEED (800 F.P.M.)



DELIVER MORE AIR PER POUND OF FUEL AND COOLER, DRIER AIR



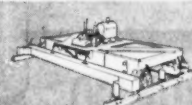
MORE MACHINE FOR YOUR MONEY
Mass production in our efficient new compressor plant keeps Jaeger prices far below current levels of materials and labor.

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The keenest buyers, the biggest users are buying Jaeger "AIR PLUS" Compressors for LOW COST air. Sizes 60 to 600 cu. ft. Service in nearly 130 cities. See your Jaeger distributor.

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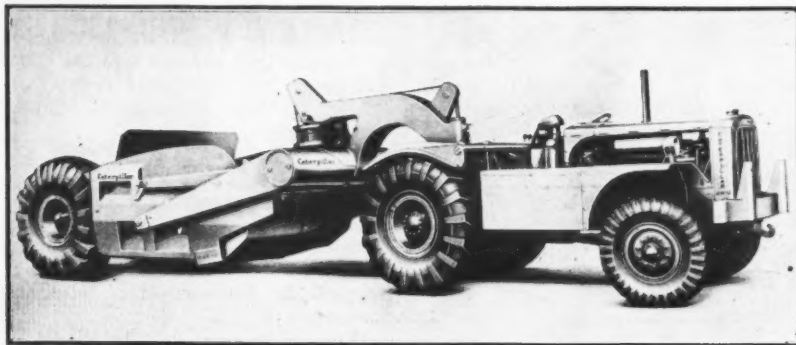
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"DUAL-MIX" TRUCK MIXERS, AGITATORS — HOISTING
ENGINES, SELF-RAISING TOWERS — CONCRETE AND
BITUMINOUS PAVING EQUIPMENT



Here is Caterpillar's new earth-moving team designed to speed long-distance hauls: the DW10 tractor with the No. 21 cable control, and the No. 10 scraper.

Tractor-Scraper Unit To Speed Long Hauls

A rubber-tired tractor-scraper combination designed to speed long-distance earth-moving hauls has been introduced by the Caterpillar Tractor Co., Peoria 8, Ill. Components of the unit are the No. DW10 tractor, the No. 10 scraper, and the No. 21 cable-control unit.

Power output of the improved DW10 tractor is 115 hp at 1,800 rpm. Some of the other advantages claimed for this unit are a double-plate semi-metallic faced clutch, equipped with heavy springs said to withstand shock and provide smoother operation; a constant-mesh transmission with helical gears in all but low and reverse; and a self-adjusting clutch brake to facilitate gear shifting.

Roller bearings on all driven gears are pressure-lubricated from a gear-type pump mounted on the front of the lower transmission shaft. Spiral bevel gears are said to provide quiet operation at hauling speeds. The rear axle is full-floating with the weight of the unit taken on the axle housing. Steering is aided by a shockless, worm-and-ball-nut type of control integral with the hydraulic booster. The heavy-duty air-actuated mechanically operated brakes have an 18-inch drum and 7-inch shoes.

The Caterpillar No. 10 scraper was designed exclusively for use with the No. DW10 tractor. It has a heaped capacity of 11 cubic yards. Features include an open-bowl design said to provide greater stability, visibility, and access for shovel and dragline loading; high apron lift; positive, forward ejection; long cable life from reeving with large-diameter precision-grooved sheaves; self-sharpening cutting edges for live loading with longer boiling ac-

tions, shorter loading distances, and less loading time.

According to the manufacturer, the No. 21 rear-mounted double-drum cable control is matched to the requirements of the new tractor and scraper. Line pulls are said to be ample to meet the most severe requirements imposed by scraper operations. Line speeds are 401 fpm for a bare drum, and 615 for a

full drum. The drum has a 9-inch diameter, 5-inch length, 15-inch flange diameter, and a capacity of 150 feet of 1/2-inch cable. Each clutch has 12 facings with friction surface areas of 564 square inches. The effective brake area is 111 square inches.

With 21.00 x 25 tires, top speed of the unit with loaded wagon or scraper is 18.8 mph with the standard transmission. With optional transmissions, this can be increased to either 21.6 or 24.5 mph. Using 18.00 x 25 tires, these speeds can be changed to 17.6, 20.2, or 22.9 mph.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 47.

Philadelphia Oil Dealer

The appointment of a distributor for the Philadelphia area has been announced by the Macmillan Petroleum Corp. of Los Angeles. Owned by John McShain, the company will be known as the Macmillan Oil Distributors of

Philadelphia. It will be under the direct supervision of Richard Schwoerer.

Air-Entraining Agent

A 20-page catalog discussing air-entrained concrete can be obtained from the Dewey & Almy Chemical Co., 62 Whittemore Ave., Cambridge 40, Mass. Feature of the catalog is a discussion of Darex AEA and how it can be used to control air as the fifth ingredient of concrete.

What is Darex air-entraining agent? How does it work? How is it used? What are its advantages to engineers and contractors? These are a few of the questions answered. There are many photographs showing the use of air-entrained concrete on highway and structural projects, on mass and ready-mixed concrete jobs, and for making specialized articles such as blocks, pipes, and other products.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 78.

**CUT YOUR CONCRETE BREAKING TIME IN 1/2
WITH "ROCKBIT"
DETACHABLE MOIL POINTS!**

● ROCKBIT detachable point before using.

● Same point after breaking 32 sq. yds. of 14" concrete.

This remarkable record of 32 square yards' breakage with one regrind was made on a street project. The job called for breaking up 14-inch concrete and was one of a series of projects chosen as testing grounds for the sensational new ROCKBIT detachable point. Other tests have proved that ROCKBIT detachable points will stay sharp longer by more than 7 to 1 and break 50% more concrete per man hour. *No other point can match this record.*

Such records are the result of long research in the laboratory and on-the-job. The ROCKBIT detachable point is forged of two different types of steel instead of the usual one. "Tough" steel gives long life to the shank. "Hard" steel gives cutting ability to the point. When the point dulls it can be detached and a new point placed on the same shank, eliminating the need of many tools. The old point can be reground by any laborer. Old-fashioned blacksmith resharpener is eliminated.

Prove for yourself that ROCKBIT detachable points will cut your time and costs. If your distributor cannot supply you, write direct to our nearest plant.



DEALERS ATTENTION: Immediate delivery from stock on all "ROCKBIT" Pneumatic Accessory Tools. Write for complete catalog and price list.

ROCKBIT
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C. & E. M. Photo

This Lorain 40 crawler crane swings a 4-yard Blaw-Knox concrete bucket from the mixer to the culvert pour. The same crane worked with a shovel boom and dipper stick at the crusher quarry on the D. F. Jones Construction Co. job.

Base Rock Tough To Blast and Crush

(Continued from page 1)

With broad embankments, wide sweeping curves, and long tangent sections, the new section of U. S. 64 will be as modern as men and machines can build a road in Arkansas. Its shoulders will let a motorist pull over even in rainy weather to change a tire.

Grading Starts the Job

There were about 162,000 cubic yards of common excavation in the project, with 7,636 cubic yards of rock digging thrown in for good measure. About 168,320 cubic yards required processing and compaction, and there were 55,556 cubic yards of overhaul material.

With that kind of set-up, the D. F. Jones Construction Co. moved in on the east half with a Bucyrus-Erie 22-B diesel-powered shovel, with two International 4-yard dump trucks. A 315-cfm Worthington compressor was also used to drive a Cleveland and an Ingersoll-Rand wagon drill. Two small rock cuts were moved out as rapidly as possible by these machines.

The main part of grading, however, consisted of digging and hauling sandy loam and clay. When work began on July 22, 1946, ground conditions were not too bad for excavating, and the severe rains which were to plague the job later had not yet begun.

The Jones Co. brought in an Adams Model 511 motor grader for dressing, a sheepsfoot roller drawn by an International ID-9 for compaction, and seven tractor-scraper teams for loading and hauling. Three of these scrapers were LeTourneau 12-cubic-yard Carryalls with D8 Caterpillars for tow power. A Bucyrus-Erie Model S-8 and three Bucyrus-Erie Model S-112 scrapers, all drawn by International TD-18 diesel tractors, completed the picture.

The subcontracting firm of Southeast Construction Co. used two D8-drawn LeTourneau 12-yard Carryalls, a Caterpillar 12 motor grader for dressing, and an RD8-drawn sheepsfoot roller for processing its part of the contract.

Balance points were such that one-way hauls of 1,500 feet were the rule rather than the exception. Grading consisted generally of making cuts not more than 6 feet deep, and raising the roadbed by about 3.5 feet where fills were designated. One 20-foot fill, however, did require a concentration of effort and equipment before it came up to the blue-tops in good shape.

No pusher tractor was used behind the tractor-scraper units because of the good loading characteristics of the soil. A 10-hour shift produced about 40 loads of earth per unit on the average throughout the job, figuring the average haul at 1,500 feet.

The earth was brought in and spread in layers from 6 to 8 inches thick. Moisture inherent in the ground was sufficient many times to go ahead with the compaction, because the normal rainfall in central Arkansas is intermittent through the summer and more or less concentrated in the winter and spring. After the dirt was spread, the sheepsfoot roller pounced on each lift and rolling was done until the tamper feet "rode up" out of the earth. Though density tests were seldom if ever made, this rule-of-thumb method assumed correct densities after rolling had been done that long. On good damp soil, about five rollings were made.

The excavating set-ups were about a mile long at a time, and all the earth within that section was graded before moving on to the next. A stationary skid-mounted grease house was pulled along to the middle of each set-up, and the equipment ganged around this shack at the end of each shift for a thorough lubrication and refueling.

Balanced dumping characteristics of

the scrapers made for easy dumping of the sandy clay soil, and their positive ejection of dirt helped to make even lifts. All the scrapers were equipped with easily installed crush-resistant 6 x 19 preformed wire rope, with an internal core of wire. This type of control cable, with a full potential of work in every wire due to its preformed construction, proved indispensable where the wear was tough and preferable to

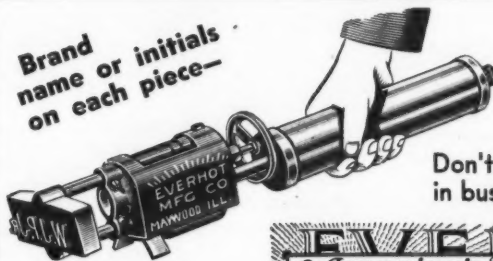
non-preformed rope even where the work was easy and routine.

Crushing the Selected Base

The hardest construction problem on the job was the setting up of primary and secondary rock-crusher units; shooting and drilling extremely hard sandstone; and putting it through the machines. That over 75,000 cubic yards

(Continued on next page)

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EATON MANUFACTURING COMPANY

Auto Division

CLEVELAND, OHIO

Base Rock Tough To Blast and Crush

(Continued from preceding page)

of material was turned out through the secondary machine without a bearing or other parts failure is, in Superintendent V. Whitley's opinion, something of a phenomenon.

A Universal 20 x 36 primary crushing plant was purchased from war surplus in the state of Washington, and shipped to Arkansas. It was bolstered then by a Pioneer portable rig, with 22 x 40 roll crushers and a double-deck screen. The plant was set up as near the center of the job as possible, in a quarry site approved by the Arkansas State Highway Commission. Since the plant was back from the highway, a 6-mile haul served the east end of the project while a 10-mile trip was necessary for a truck to haul to the west end.

Drilling and shooting the hard sandstone to a size small enough to pass through the primary crusher was tough indeed. The quarry had a 12-foot-high face of good hard sandstone, but 18-foot drill steel would go down into a ledge of rejectable slate. The Cleveland and Ingersoll-Rand wagon drills used in the quarry were therefore equipped only with 6 and 12-foot drill steel, to keep the blasting force well up within the acceptable limits of the rock.

Detachable rock bits 2½ inches in diameter were used, but the rock was so hard and abrasive that one 12-foot hole dulled a bit and wore its gage to the point where further sharpening was not economically justified. Holes went down in from 3 to 10 minutes each. Sometimes a ledge 4 feet deep might drill easily, but then the drill bit would hit extremely hard going and a 2-foot-deep pocket might require 5 minutes of drilling to penetrate the formation.

Blasts were calculated on the basis of about 120 holes, set 4 feet center to center on a grid pattern. Holes were loaded well up towards the top of the ledge, after being sprung. Atlas No. 3 gelatin powder was used, at an explosive ratio of ¾ pound per cubic yard of rock.

An odd feature of the rock-quarrying technique was the use of A, B, and O delayed-action blasting caps for detonating the explosive charges. The A caps were set on the outer holes towards the face of the quarry, the B caps farther in, and the O caps farthest away from the face. When the charges fired, the rock shattered from the face in, resulting in a well-fractured blast each time a shot was pulled.

A Lorain ¾-cubic-yard shovel was used with two Mack 8-cubic-yard end-dump trucks to get the blasted rock to the crushing plant. Double-spotting methods were generally possible, though unnecessary due to the employment of only two hauling units. The trucks dumped their loads of broken stone to the receiving hopper on the Universal jaw crusher, and the rock passed through the primary and secondary units. The abrasive tough nature of this sandstone made some mechanical repair work necessary when the plant was torn down, but the secondary-crusher unit functioned without a breakdown for 75,000 cubic yards.

On the best day's run, the plant put out 1,144 cubic yards of crushed rock in an 11-hour shift. This was an exceptional day, however, and ordinarily the plant averaged 700 cubic yards for the 11-hour shift.

The base-course material was carefully screened and had to meet the following state specifications:

Screen Size	Per Cent Retained	Per Cent Passing
1½-in-h	0	....
¾-inch	10-50	....
No. 40	50-75	....
No. 200	....	7-20



C. & E. M. Photo

A Kwik-Mix Dandie mixes concrete for culverts on "the new road" west of Beebe, Ark. There were seven of these reinforced-concrete structures on the job, totaling about 2,000 cubic yards of concrete pouring.

Crushed rock was hauled from the plant out to the new road and carefully spread according to early measurements. In order to make a 7-inch compacted-rock blanket, it had been determined previously that about 9 uncom-

pacted inches would have to be spread. This went down in two 4½-inch lifts, which figured 55 cubic yards to the station. A man from the Highway Department supervised the dumping of truck loads to insure the correct amount

in the lift.

The trucks were dumped to put 55 cubic yards in the first lift. The Adams 511 motor grader then knocked down and spread the material. As soon as it was spread, passing traffic began to compact and bind the crushed rock. By the time the first lift had been finished throughout the job, the second was ready to go in. This base is now open to traffic, and it was expected to be used most of the summer before the new contractor who has the surfacing contract could start the black-top operation.

The placing of a traffic-bound rock sub-base under Arkansas main-stem highways is a modification of standard procedure used all over the United States, depending on the available natural material. It is expected that this base will be strong, durable, and pervious to some extent. It will carry the traffic load transmitted by the bituminous pavement, when that phase of the work has been completed.

(Concluded on next page, Col. 4)



TEXACO Rustproof Compound, applied to exposed metal surfaces, effectively prevents rust. More than that — if rust has already started, *Texaco Rustproof Compound* penetrates it, loosens it for easy removal, and prevents any further rusting.

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every Sunday night.
See newspaper for
time and station.



TEXACO

New Land Terracer

A trailer-type land terracer is one of the products made by the Dawson Mfg. Corp., Box 110, South Gate, Calif. This Pacific No. 1 terracer has a blade length of 8 feet, and is said to exert a maximum blade pressure of 1,587 pounds.

Lift above ground is 9 inches, side shift is 10 inches, there are nine pitch positions, and the unit has a cutting depth of 7 inches. Rear tread, from flange to flange, is 3 feet 10 inches. Overall length is 12 feet 1 inch, width is 4 feet 6 inches, height is 5 feet, and length from drawbar to rear axle is 10 feet 9 inches. Total shipping weight is approximately 1,400 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 44.

Truck Bodies and Hoists

A catalog describing its truck-body and hoist line has been issued by the Kewanee Mfg. Co., Kewanee, Ill. Bul-



A Pacific No. 1 terracer pulled by a Caterpillar D2 tractor is shown here at work on a ranch in Mercedes, Texas. It is used for plowing, land leveling, etc.

letin KBH 647 describes each of the units in the line, also listing general construction features and details which are common to them all.

Units described in the folder are the Type A steel truck bodies, the Type B bodies, the special bodies, the hydraulic hoists, vertical hand hoists, and special

equipment available for these units. The folder lists all sizes in which each of the models is made, gives specifications, and describes the uses for which each is designed.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 71.

Base Rock Tough To Blast and Crush

(Continued from preceding page)

Bridges and Culverts Poured

There were seven bridges or reinforced-concrete culvert structures more than 20 feet in length, totaling about 2,000 cubic yards of concrete pouring. These structures were formed in place in the field, the concrete mixed on the site, and placed in accordance with specifications.

Lone Star and OK Superfine portland cement was used for a 2-sack batch, with the mix figured on a 1-2-4 ratio, 6 sacks of cement per cubic yard. Wheelbarrows used on the job to feed aggregate and sand from the stockpiles to a Kwik-Mix Dandie concrete mixer were carefully calibrated by weighing the ingredients placed in the first structure.

A labor gang of white men and Negroes was used to fill wheelbarrows of material up to the calibrated mark. Bag cement was opened and dumped in the mixer skip with the sand and aggregate. Mixing water from near-by streams was used. The concrete was discharged from the mixer with about a 2½ to 3-inch slump. A Blaw-Knox ¾-yard concrete-placing bucket, carried by a Lorain 40 crawler crane, took concrete from the mixer and placed it in the bridges.

Construction of the bridges was of course somewhat delayed pending completion of embankments. The job was also so organized to make good use of available equipment. Use of the Lorain machine as a crane, for instance, tied in very nicely at the end of its regular work with shovel boom and dipper stick in the crusher quarry.

Job Personnel

On-the-job officials for the D. F. Jones Construction Co. included V. Whitley, General Superintendent, and Fred L. Bridges, Superintendent of Bridges and Concrete. Resident Engineer for the Arkansas State Highway Commission was W. D. Stuart, Jr.

The project was designed and is being built under the general direction of J. C. Baker, Director of Highways. W. W. Zass is Chief Engineer. And E. E. Mashburn, Principal Engineer of Construction, is in overall charge of the job.

IARC Resumes Activities

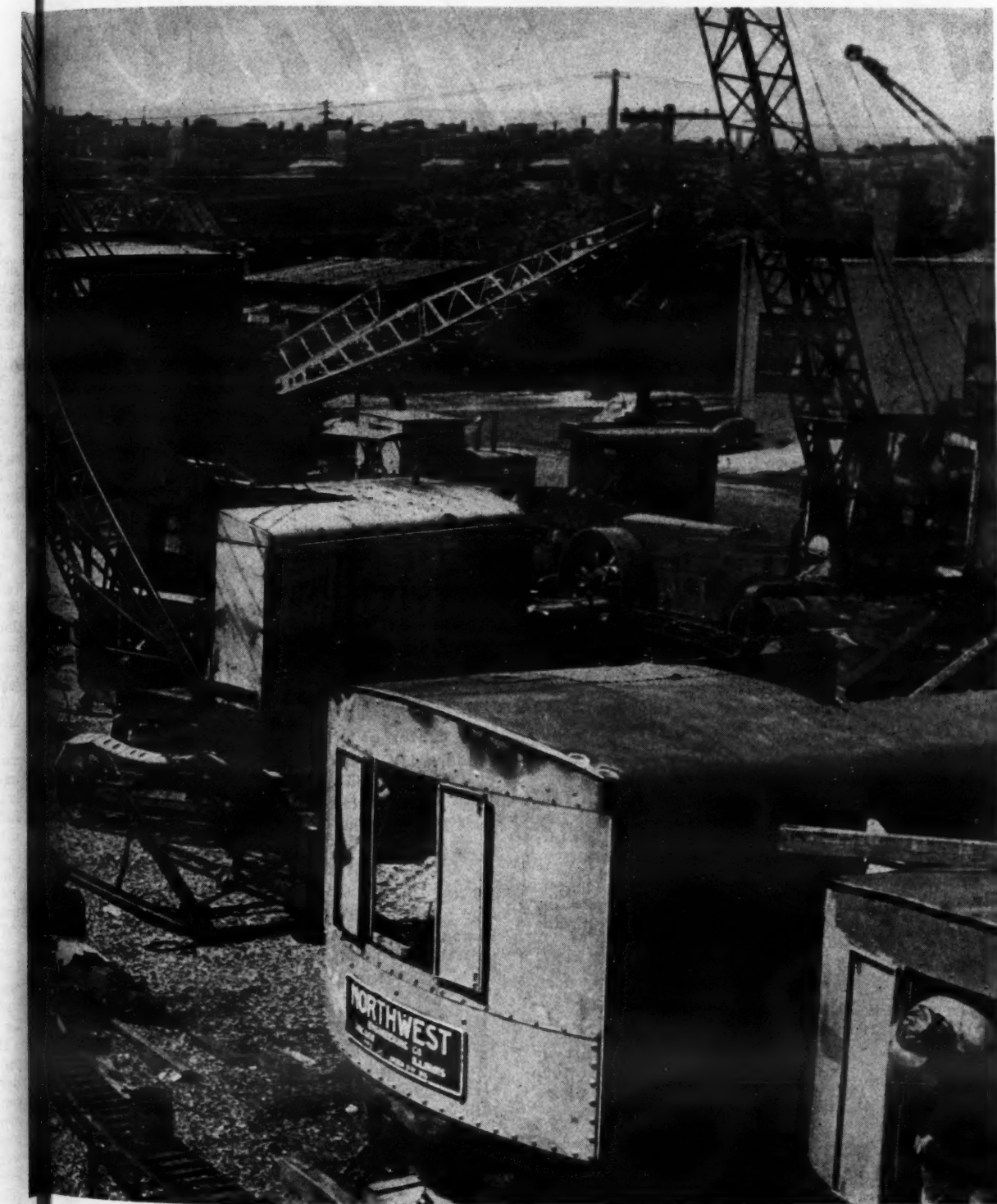
The Permanent International Association of Road Congresses has announced that it will again resume its activities, held in abeyance since 1939. The action was agreed upon at the recent Paris meeting of the Permanent Commission of the Association.

Monsieur D. Boutet was unanimously elected President, and Monsieur Naud was elected Secretary-General. M. Boutet is Vice Chairman of the Council of Roads and Bridges of the French Ministry of Public Works and Transport; M. Naud is Inspector-General of roads in the same department.

Canvas and Tarpaulins

Fire-resistant canvas which can be made up into tarpaulins, tents, etc., is described in a catalog put out for Wm. E. Hooper & Sons Co., Juniper and Cherry Sts., Philadelphia, Pa. It is said that the Hooperwood Fire-Chief cotton duck will not support combustion even when directly exposed to flame. It will char, and the cotton may carbonize, but the fabric will not flare up, says the manufacturer. It is also claimed to be water, mildew, and weather-resistant.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 63.



Rustproof Compound

WASHO Meeting Held in Montana

Western Highway Heads Review Present Problems And Adopt Resolutions At Annual Meeting

★ "THE time has arrived to speed up the highway construction program."

That was the advice which 255 delegates of the Western Association of State Highway Officials were given at their 26th Annual Meeting at the Florence Hotel, Missoula, Mont., August 6-8. The speaker was H. E. Foreman, Managing Director of the Associated General Contractors of America.

"Contractors' organizations can be compared to football teams," Foreman said. "They require work to become welded into an efficient and smooth-running team. No contractor's organization can improve by being idle. A crew at work is a better crew when there is the reasonable expectancy of another job than one which has no prospect for more work."

Pointing out that the states which delayed their construction in the hopes of lower prices in the future had been disappointed by higher prices instead, Foreman added that in the judgement of contractors, highway departments have little to gain, and much to lose, by delaying the award of additional contracts when favorable conditions prevail.

"What I consider the most significant trend brought out by a recent AGC survey," Foreman said, "was the fact that during the past two months the trend has been for highway construction costs to level off or to lessen."

New Officers Elected

Tom W. Holman, Chairman of the Washington Highway Advisory Commission, was elected President of the western organization for the coming year, succeeding Al F. Winkler of Kalispell, Mont., present Chairman of the Montana State Highway Commission. W. C. Lefebvre, State Highway Engineer of Arizona, was named Vice President, replacing Tom W. Holman. E. V. Miller, Assistant Deputy State Engineer of the Arizona State Highway Department, succeeds himself as Secretary-Treasurer.

The new Executive Committee for the coming year will be composed of J. R. Bromley, Superintendent of the Wyoming State Highway Department; James Reid, new Director of Highways of the Idaho Bureau of Highways; and Mark U. Watrous, State Highway Engineer of the Colorado State Highway Department.

Important Resolutions Passed

Resolutions calling to the attention of Congress and the various state legislatures matters of vital importance to the highway program were passed. One resolution called for the orderly continuation of the Federal-Aid highway program, specifically requesting that \$500,000,000 be allotted for the fiscal years 1949, 1950, and 1951, under the same terms as those in the Federal-Aid Act of 1944, except in the matter of allocations to the grade and crossing fund, which should be studied further.

Another resolution asked for an immediate allocation of appropriated funds for forest highway construction, pointing out in preamble that the forest highway program in many western states is far short of requirements. The delegates also went on record as opposing HR 2840, otherwise known as the Wigglesworth Bill, and called for a continuation of present programming and planning methods.

With highway safety in mind, a resolution was passed recommending that airports be kept sufficiently far away from highways to permit a clearance of at least 50 feet of commercial aircraft over the pavements. In a discussion of this resolution, State Highway Engineer R. H. Baldock of Oregon said that his department had received requests for permits involving clearances as low as 15 feet.

A recommendation was also made that the American Association of State Highway Officials should re-study the highway numbering system in the United States, with a view to replacing the miscellaneous naming and number-

ing system of minor routes. Roads on the strategic interstate network would not be seriously affected, however, since the intent and spirit of this resolution was aimed at those numerous minor roads, some of them dead end, which are a part of the numbered national network.

Governor Opens Meeting

The 26th Annual Meeting was opened by an address of welcome by Montana's Governor Sam C. Ford, who called for an extension of the Federal-Aid secondary road system. Pointing out that the nation's commodities usually start on their way to market over secondary

highways, the Governor asked that the program be enlarged.

At the same time, he said, Federal-Aid should not stipulate fixed sums for projects, but should leave that matter to the state highway departments concerned. He called for a lowering of the state's participating share on high-standard strategic interstate construction to about 70 or 80 per cent of the amounts now contributed by the states, on the ground that Federal-Aid standards are higher than state roads require.

H. E. Hilts, Deputy Commissioner of the Public Roads Administration, sur-

(Continued on next page, col. 4)

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the NEW LaPlant-Choate *high-speed*

- Speeds:** 4 forward, 1 reverse
2.76 to 18.00 m.p.h.
(Conservative rating)
- Engine:** Buda Supercharged Model 6-DCS-844
225 h.p. at 1800 r.p.m.
6 cylinders
844.2 cu. in. piston displacement
- Gasoline starting engine, 60 h.p.**
- Steering:** Finger-tip, positive hydraulic steering eliminates jackknifing. 27' level turning radius. 60 degree turn each way.
- Capacity:** 14 yards struck
17.5 yards heaped
- Tires:** 21:00 x 29
Interchangeable front and rear.
- Brakes:** Four heavy-duty Timken-Detroit air brakes. May be applied to all four wheels simultaneously or to rear wheels only as operator desires.

Low center of gravity

Modern LPC Scraper: Curved reinforced bottom; 3-piece offset cutting edge; positive forced ejection; 103" apron opening; open top for easy loading by shovel or dragline; axles supported at both ends for maximum strength; heavy-duty, self-aligning type pusher block; sheaves and cables out of the dirt.

Dimensions: Over-all length 34'10"; over-all width 11'5"; over-all height 9'3 1/2"; wheel base 21'4 3/8"; wheel tread (front and rear) 88". Weight empty approximately 42,500 lbs.

See your nearest LaPlant-Choate distributor for performance data and delivery dates. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; 1022 77th Ave., Oakland 3, Calif.

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HIGH SPEED EARTHMOVING

FOR LOWEST POSSIBLE COST
PER YARD...PER JOB...PER HOUR

Land-Drainage Handbook

A drainage handbook of value to soil-conservation engineers and contractors has been made available by the Buckeye Traction Ditcher Co., Findlay, Ohio. Written in nontechnical language for use by laymen, it is also of aid to the experienced technician.

This 48-page catalog discusses the benefits of drainage, where drainage is needed, methods of drainage, and other phases of the theory involved. It shows how to design a system of drains, shows a typical installation, and describes several methods of laying the drainage tile. Featured throughout the catalog is the

Buckeye Model 301 drainage trencher. Several photographs show it in use, and descriptive text explains features and advantages claimed for it.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 75.

Diesel Engines for Trucks

A 16-page three-color booklet about four diesel engines has been put out by The Buda Co., 154th and Commercial Ave., Harvey, Ill. Units described are the Model 844 180-hp 6-cylinder diesel, the Model 844 Super 225-hp 6-cylinder engine, the Model 1125 240-hp 8-cylinder

engine, and the Model 1125 Super 300-hp 8-cylinder engine. These engines are recommended by the manufacturer for trucks for both off-highway and on-highway use.

Bulletin No. 1332 describes design features, the positive-lubrication system, and the Buda slow-pressure combustion system. Several pages are devoted to describing and picturing uses of the Buda diesel engines. Also included in the catalog is a description of the Buda plant and its sales and service organization.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 72.

WASHO Meeting Held in Montana

(Continued from preceding page)

prised the assemblage by reporting that the general traffic pattern in the west is quite similar to that in the rest of the country, according to a recent survey made by his department. However, heavy combination loads in the west more than doubled, increasing only about 50 per cent in the rest of the nation, he said.

Pointing out that maintenance costs are now up 40 per cent over 1941 prices in Montana, and follow a similar pattern elsewhere, Hilts recommended that new construction designs be studied very carefully with a view to reducing maintenance costs required for future highways.

Danner Discusses Equipment

In an extemporaneous address, spiced with repartee from an open discussion of the equipment picture, President William A. Danner of the Associated Equipment Distributors promised service on equipment by distributors "such as you gentlemen have never before seen".

"The manufacturers will soon stock many of their distributors with up to three times as many repair parts, with a complete selection and better service, as has ever been customary in the past," Danner said.

Bolstering the thought advanced by Foreman that contract prices have now leveled off or dropped slightly, Danner pointed out that about 75 per cent of the equipment manufacturers are now quoting straight prices, and have eliminated all escalator clauses. "This will make for really competitive bids," Danner said, "and prices will probably not rise."

Danner predicted that as much as 95 per cent of construction equipment may be rubber-mounted within the next five years, and asked the assembled engineers to plan for bigger jobs to justify the capital investment, on the part of contractors, in larger machines. Only by letting the contracts in larger increments, he said, can the full advantages and lowered costs made possible by bigger equipment be realized by the state highway departments.

Vibratory rolling equipment which has now reached the testing stage was one of the new developments mentioned by Danner, but he promised that the metamorphosis of equipment would be an orderly process, not accompanied by any wild price increases. "The rise in price of construction equipment, about 25 per cent over 1941 as a top figure, is less than many another ordinary commodity," Danner added. "Shovels, cranes, backhoes, and motor graders are presently the scarcest items."

Better Public Relations Urged

Better public relations were urged by Governor Ford, by President Al Winkler, by Clarence B. Shain, State Highway Director of Washington, and by Hal H. Hale, Executive Secretary of the American Association of State Highway Officials. Mr. Hale, in a prepared address on the subject, urged that all state highway departments fight the distorted propaganda of pressure groups by giving the public all of the facts, impartially.

"The time has come when you must make a choice whether to take these constant attacks lying down, or whether to assume the initiative and give the public all the facts. They are necessary, if the public may judge intelligently. The public has a right to the facts," Hale said.

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SCRAPER



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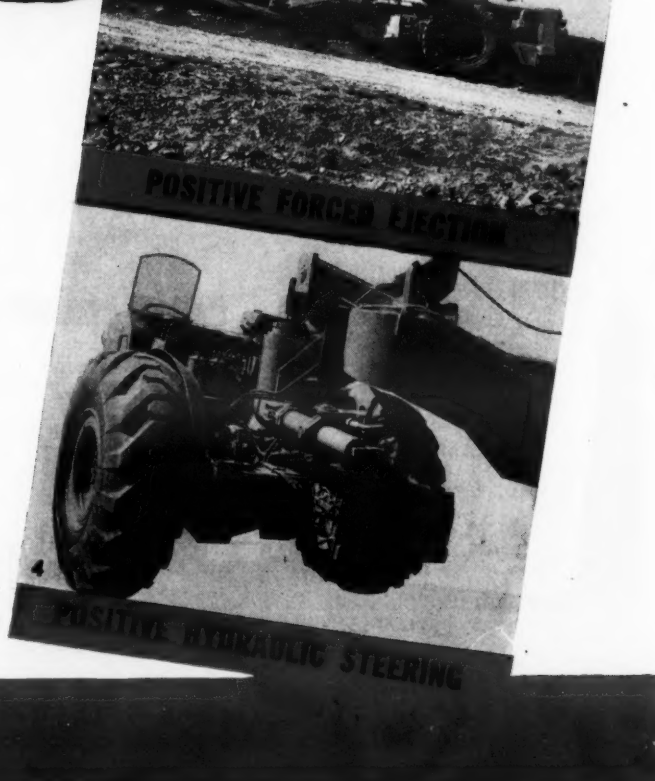


1. In the new LPC Moto-Scraper, there's plenty of power in the big engine and plenty of traction and flotation in the huge tires for the highest average haul speeds with heaped loads over all kinds of terrain.

2. Modern LPC scrapers—proved by competitive tests to be the easiest loading, fastest spreading scrapers on the market—will make even more profit for you in these new high speed Moto-Scrapers.

3. LPC positive forced ejection quickly and easily spreads all your loads whether you're handling dirt, sand or mud and sticky gumbo, and will do it in high gear to save valuable seconds on every trip.

4. Tractor and scraper are joined by pedestal hitch. With LaPlant-Choate positive hydraulic steering 60° turns each way are quickly and easily accomplished with power on both wheels.



WASHO Meeting

(Continued from preceding page)

The present status of the post-war program was reviewed by W. L. Anderson, Assistant Chief Engineer in Utah, and effects of industrial trends on the design of bridges were discussed by E. H. Thomas, Bridge Plans Engineer of the Montana Highway Department. Thomas said that bridge engineers now must design structures for loads of 20 to 30 or even 40 years hence. He called for H-20 S-16 loading standards.

Uniform standards of load-limit enforcement in all the states was urged by F. L. Mathes of Idaho in one of the most vital papers of the session. He pointed out that the trucking interests have a logical argument so long as the states cannot agree on any loading standards. At present California and Nevada permit the heaviest loads in the west, up to 76,400 pounds gross.

Montana, which recently passed load-limit legislation, has granted enforcement power to any maintenance employee as well as to peace officials and officers of the state highway patrol. Maintenance men have not made any actual arrests, but have discovered 191 violations since the inception of the law and have had the violators arrested by the state highway patrol. One violator was a 19-time offender. Various others were 5 to 7 time repeaters.

President Al Winkler, in his annual address, said that only by meeting these challenges and bringing highway standards up to a new level of efficiency could state highway departments everywhere rise to their full stature.

Trailers, 5 to 8 Tons

A line of tilting-top single-axle trailers has been designed by the Ray Miller Research Engineers, 4320 W. Martin Drive, Milwaukee 8, Wis. They are made in three models. The Model B has an 8-ton capacity and is said to handle tractors of the size of the International TD-9 with bulldozer blade. The Model F is a 5-ton general-purpose trailer. The Model R is the same as the F, except that it has a narrow platform and a climbing angle for loading of 9 degrees.

The Model B has a platform 8 x 14 feet and a height above the ground of 31 inches. It uses dual 7:50 x 15, 10-ply crayon-cord tires. The Model F has a platform 8 x 14 feet, 31 inches above the ground. The Model R is 4 feet 8 inches x 14 feet, 22 inches above the ground. Both the F and R use dual 7:50 x 16, 6-ply implement tires.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 41.

Distributors for Davey

The appointment of three distributors in different parts of the country has been announced by the Davey Compressor Co., Kent, Ohio. Distributor for the state of Maine will be the S. J. Reed Co., 204 Forest Ave., Portland, Maine. Fly & Harwood, Inc., will handle the Davey line from the company headquarters at 300 Madison Ave., Memphis, Tenn. Cal.-Ore. Machinery Co., 944 So. Central Ave., Medford, Oreg., has been named dealer for the counties of Coos, Curry, Douglas, Harney, Jackson, Josephine, Klamath, and Lake.

Cleans by Vapor Blasting

Equipment for cleaning by means of a blast of sand and vapor is the subject of a folder issued by the Vapor Blast Mfg. Co., 333 So. 16th St., Milwaukee, Wis. The equipment is designed for cleaning steel structures, machinery and equipment parts, hardened concrete preparatory to another pour, etc.

Any hard sand ranging from 20 to 80 mesh may be used. Metrolux, a rust-proofing chemical, is added when treating metals which are subject to rust. These ingredients are mixed with water vapor in proper proportions to obtain the best results.

The bulletin describes in detail the Model B-10, a completely automatic unit. It also tells how the unit operates, type of work performed, operational cost, and special equipment.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 68.

Adjustable Snow Plows

A line of adjustable snow plows for use with track-type tractors, trucks, or motor graders is described in a catalog put out by the Wentz Equipment Co., 600 No. Van Buren St., Topeka, Kans. Printed in two colors, this 8-page catalog pictures the various models and gives complete specifications.

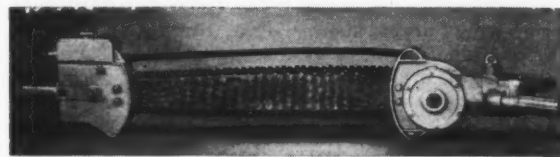
Models M and MM are V-type plows

for use with motor graders. Models H and HH are reversible plows for track-type tractors. Models AA, A, B, and C are V-type plows for use with track-type tractors. Models E, EE, and EEE are one-way truck plows. Models G and GG are reversible truck snow

plows. Models E-R, EE-R, and EE-RR are rigid one-way truck plows. The last models described in the catalog are K, KK, and KKK V-type truck plows.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 90.

Cuts Piling 12 Times Faster Than Hand Sawings



That's the experience of a prominent Chicago organization with the new Lombard air saw. Six average 14" diameter piles were cut in 7 seconds—normally would take two men with hand saw 1½ hours. Weighs only 46 pounds. Demonstrations available by local dealers in most states. Immediate delivery on air, gas and electric units.

LOMBARD CHAIN SAWS

Lombard Governor Corporation

Ashland, Mass.

MEMO
TO STOCK PILE OPERATORS
of Sand—Gravel—Crushed Rock
and Coal—Top Soil or Mill Tailings

Immediate Delivery!
on Model 75 Haiss Loaders
from Chicago
or New York

HIGH SPEED LOADING
means Greater Yardage handled
per truck per day!

You can't beat the STRAIGHT LINE CONTINUOUS LOADING principle of the Haiss bucket loader. This machine will handle 3 times the yardage of machines that sell for double its price. Engineered end to end . . . top to bottom . . . featuring a rugged, oil-bath-enclosed transmission that can "take it" . . . and manganese steel digging blades for hard abuse . . . you can count on Haiss for mechanical reliability. Complete information will be sent promptly upon request to

PETTIBONE MULLIKEN CORPORATION
Chicago 51, Illinois

Model 75W Haiss Loader—3 yds. per minute capacity. Also with crawler tread mounting as Model 75C.



PROMPT DELIVERY ON
Larger Capacity Sizes

MODEL 77
with high elevator
3 yds. per min.

MODEL 80
5 yds. per min.

MODEL 135
8 yds. per min.

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A PETTIBONE MULLIKEN PRODUCT

"Quality Since 1880"

PETTIBONE MULLIKEN CORPORATION

Conveyors • Material Handling Pumps • Dragline and Clamshell Buckets • Shovel and Pull Shovel Dippers

Piers Constructed For Naval Vessels

Steel H-Piles Support 11 Piers 1,845 Feet Long; Concrete for Deck Was Pumped Through Pipe Line

TO provide berths for inactive vessels of the Florida Group, Atlantic Reserve Fleet, the U. S. Navy Bureau of Yards and Docks has constructed new facilities at Green Cove Springs, Fla. These facilities include eleven steel and concrete piers jutting 1,845 feet out into the St. Johns River at a point where it is 2 miles wide.

The piers are parallel, 500 feet on centers. They are 30 feet wide with the exception of the center or service pier, No. 6, which is 50 feet wide. Supported on steel H-piles, the pier decks are constructed of reinforced concrete. They will accommodate 554 naval vessels from landing craft up to destroyer escorts.

The St. Johns River flows north in the eastern part of Florida. At the site selected for the piers, it makes a great bend to the west before continuing its northerly flow towards Jacksonville, 27 miles away. At Green Cove Springs, the water is almost fresh, with only a slight touch of brackishness. This makes the site ideal for berthing ships, and eliminates the problem of removing salt-water barnacles from the hulls. The site is about 50 miles above the mouth of the river at Fort George Inlet where it empties into the Atlantic.

The project got under way in March, 1946, with the dredging of a huge rectangle in the river to provide flotation for the ships to be berthed at the piers. This rectangle is 5,660 feet running east and west off the left bank of the river; it is 2,650 feet in a north-south direction perpendicular to the flow. The dredged area is not of uniform depth: the greater portion, 3,845 feet of its long dimension, provides 18 feet of water, while the area around the center service pier was dug to 35 feet. The remaining 1,815 feet at the upstream end of the rectangle, where smaller craft will be berthed, was dredged to only a 13-foot depth. In addition, a 600-foot channel was dredged to a 15-foot depth for a length of 1,600 feet to connect with the main river channel.

Dredging was done by the suction dredge Jamaica Bay belonging to the Standard Dredging Co. of New York, N. Y. First a bulkhead was built 5,405 feet long, roughly paralleling the shoreline but from 300 to 600 feet out from the left bank of the river. The eleven piers were later constructed perpendicular to the bulkhead line.

Interlocking steel sheet piling, 27 feet long x 15 inches wide, was driven to form the bulkhead. Over this piling a concrete cap, 2 feet wide x 1 foot deep, was constructed at elevation 8.7 (at the top of the cap). Behind this bulkhead the intervening distance to the shoreline was hydraulically filled with sand pumped from the dredged area. The rest of the dredged material, consisting of mud, silt, and clay, unsuitable for fill,

was pumped across the river on pontoon lines and spoiled along the right bank.

The 6,000,000 yards of dredging required was completed by December, 1946. On the "made" land directly behind the bulkhead a 40-foot road with a 6-inch lime-rock base was laid. It served as a work road for the main pier construction which began in July, 1946, and was substantially completed in April, 1947.

Steel and Concrete Piers

Merritt-Chapman & Scott Corp. of New York, N. Y., was awarded the Navy contract for constructing the eleven piers, whose mass 28,410 cubic yards of concrete is supported on 4,990 steel H-piles. These piles, 80 to 85 feet

long, are 12-inch 53-pound sections under all the piers except the wider service pier at the center, where 14-inch 73-pound sections are used. The steel was shipped by rail, and a special spur was built from the Atlantic Coast Line railroad to the job site at Green Cove

Springs for efficient handling of this and other material used in this construction.

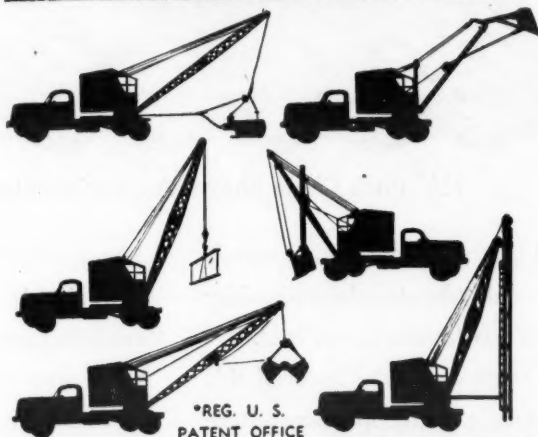
When the piles were received at the yard, they were given a prime coating of hot asphalt and painted with black

(Continued on next page)



Official U. S. Navy Photo

The U. S. Navy Bureau of Yards and Docks has constructed eleven steel and concrete piers in the St. Johns River at Green Cove Springs, Fla., to berth inactive vessels of the Florida Group, Atlantic Reserve Fleet.



*REG. U. S. PATENT OFFICE

Wherever you put "QUICK-WAY" to work you get quick proof that it's a money maker. Use it as a shovel, dragline, clamshell, crane, trench-hoe or pile driver—it's convertible in minutes. Delivers equally efficient performance in any of these six ways because it's perfectly balanced for truck mounting.

Fast in operation ON the job, it saves you money BETWEEN jobs. Move it between jobs at truck speed, on or off the road... without waiting for slow and expensive trailer transport. You can place it where larger equipment would be too slow or could not be operated profitably.

Interchangeability of parts, rugged simplicity, low first cost and low maintenance cost... any way you size it up, "QUICK-WAY" means more profit on your investment and payroll hours.

Any "QUICK-WAY" Distributor will gladly take you where you can see this equipment in operation and can talk to the man who owns it... Regardless of what larger equipment you have, you need "QUICK-WAYS", too.

Model E: 4/10 cu. yd. cap., for mounting on any standard 5-ton truck.

Model J: 1/2 cu. yd. cap., for mounting on any standard 1 1/2-ton truck.

Service available from distributors strategically located throughout the United States and world wide

For speed, portability, economy of operation, and adaptability to a wider range of jobs, nothing of comparable size equals a "Quick-Way" Truck Shovel.

"QUICK-WAY" TRUCK SHOVEL CO.
DENVER, COLORADO

First to build power shovels for truck mounting; still the leader after 28 years

TRANSITS and LEVELS
HEADQUARTERS for
REPAIRS—any make

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C. & E. M. Photos
Here are two views of a Smith truck-mixer on a Mack truck discharging concrete via chute to the 5-yard hopper of a Rex 200 double 8-inch Pampcrete. The unit is mounted on a 60 x 30-foot steel barge moored to the pier bulkhead at Green Cove Springs, Fla.

Piers Constructed For Naval Vessels

(Continued from preceding page)

enamel as a rust preventive. Then they were hauled to the bulkhead line, loaded on barges, and towed out to the driving rigs. Three Northwest and one locomotive crane were part of the contractor's land equipment for material handling. Floating equipment included three pile-driving rigs, four derrick barges, twelve deck scows, and three tugboats.

The bearing and batter piles were driven two each to a bent; bents were on 20-foot centers except at the expansion joints where they were only 8 feet on centers. Three expansion joints of 3-inch telescoping steel were built into each pier, one joint at the bulkhead, the next 608 feet out, and the third 1,216 feet measured from the bulkhead line.

In the bents a plumb pile was driven 10 feet from the center line on each side; the other two piles were driven on the pier center line, one battering towards one of the outer piles and the other battering towards the opposite side. The plumb piles were driven first by the floating drivers equipped with 90-foot steel leads and using either a Vulcan No. 1 single-acting or a McKiernan-Terry 10B3 double-acting hammer. Stirrup clips were then welded on each side of the plumb piles to hold two 6 x 18 transverse timbers on each side.

The 4-on-12 batter piles were then driven, using a derrick barge equipped with an American 30-ton revolving whirley and a 114-foot live boom. No leads were needed as the batter piles

were set against the transverse timbers and driven with a McKiernan-Terry S5 single-acting hammer. Stirrups were also hung over the batter piles as a support for the cross timbers on which

the falsework was then placed.

Timber Forms

The transverse timbers on each side of the bents held ten 6 x 12 longitudinal stringers; two stringers went under each of the three longitudinal reinforced-concrete beams which are part of the pier superstructure. One beam is on the pier center line and the other two are 10 feet off on each side. The other stringers are on the sides beyond the beams, one pair supporting a construction walk running along one side of the pier. Wooden wedges were placed between the transverse timbers and the stringers so that the latter could be raised or lowered to reach the exact desired grade for the deck.

All the heavy timber falsework was handled by the steam-derrick barges. The wood panel forms for the beams and deck were fabricated on a carpenter's pontoon barge which was moored alongside the pier. A SkilSaw air-driven table saw with a 10-inch blade

(Continued on next page)

Delivering the Power on Manitowoc's SPEEDCRANES

For High Yardage and Low Maintenance



Partial view of Manitowoc Speedcrane Engine showing DIAMOND Roller Chain Drive.

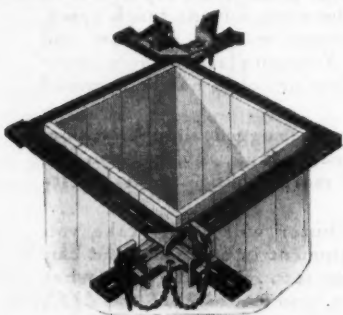
1 1/4" Pitch Chain Shown Approximately Half Size

As experienced earth movers know, steady hour-by-hour and day-by-day dependability add up to greater yardage at lower cost.

Manitowoc's engineers have assured this dependability of their sturdy Speedcrane line by delivering the power reliably and economically via DIAMOND Roller Chain Drives.

As positive as gears, these Roller Chains transmit power without slip—they share the load over many sprocket teeth,—have great reserve strength,—and operate smoothly over a wide speed range at a maintained high efficiency of 98-99%.

The cooperation of our engineering staff is available when changes or new models are being contemplated. This assistance may help save your time in selecting capable drives. DIAMOND CHAIN COMPANY, Inc., Dept. 487, 402 Kentucky Avenue, Indianapolis 7, Indiana. Offices and Distributors in All Principal Cities.



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Symons Ever-Square Column Clamps great popularity in the building field is due to these distinguishing features, (1) one-piece bracket with 90 degree angle . . . assures positive square-up of the column, (2) adjustable to smallest fraction, (3) bars of alloy steel, corner brackets of malleable iron, (4) no detachable parts, (5) long range adjustment (no dead spots), (6) two units; both alike, (7) carpenter hammer, only tool required.

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SYMONS
CLAMP & MFG. CO.
4251 Diversey Ave., Chicago 37



Piers Constructed For Naval Vessels

(Continued from preceding page)

did most of the cutting.

The three longitudinal beams are 16 inches wide x 30 inches deep; the transverse beams on 20-foot centers, which form a concrete cap around the tops of the piles, are 12 inches wide x 33 inches deep. At the four corners of the H-piles, steel rods 1 1/4-inch square x 24 inches were welded vertically so as to project up into the beam cap and deck, furthering the bond between the sub and superstructure. All job welding, pile cut-offs, etc., was done by twelve Lincoln 400-amp welders and eight Hobart 300-amp welders.

In building forms for the beam bottoms, 2 x 6's were laid on the stringers at 30-inch intervals to support the 1/2-inch plywood. The same-size plywood was also used in the beam side panels, which were backed with 2 x 6 studs on 24-inch centers and 2 x 6 wales on 18-inch centers. Cross bracing between the beams consisted of 4 x 4's on 18-inch centers. Deck panels were also built of 1/2-inch plywood supported with 2 x 6 studs at varied spacing. The deck on the ten piers that are 30 feet wide cantilevers 5 feet beyond the outer pile line on each side.

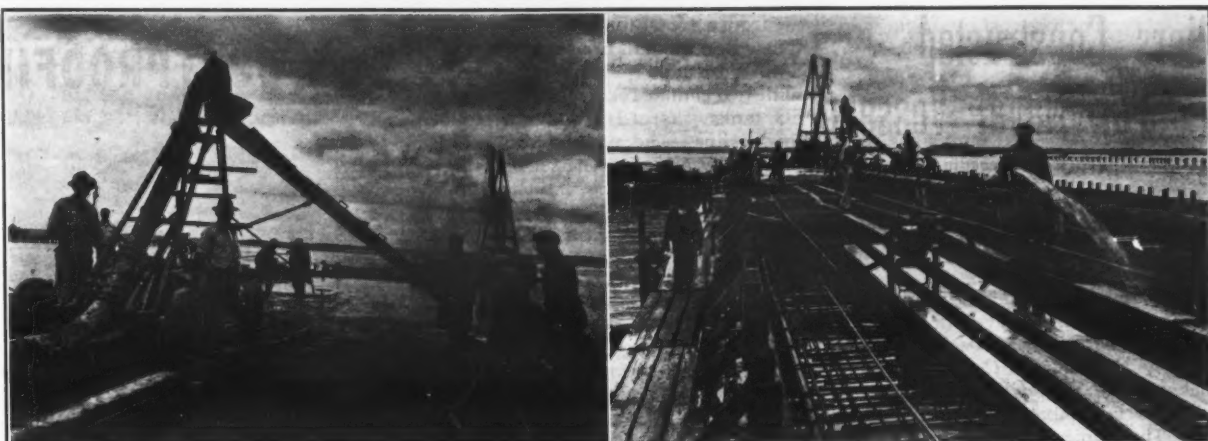
After the deck forms were completed, the forms for the 6-inch curb were built with 2 x 10's supported by a 2 x 4 every 3 feet. At the center line the deck slab is 9 inches thick; it is 8 inches thick at the curbs, which are 28 feet 4 inches apart.

With the form work completed over a 200-foot section, the usual length of a pour, the reinforcing steel was set in place. This was furnished by the Connors Steel Co. of Birmingham, Ala., and shipped by rail to the job site.

Concrete Operations

A concrete batch plant was set up in the yard along the rail siding. There the coarse and fine aggregate were unloaded from gondola cars by a Link-Belt Speeder crane with a 45-foot boom and a Haiss 3/4-yard clamshell bucket. Sand was supplied by All Florida Sand, Unincorporated, of Interlachen, Fla., and shipped 75 miles over the Atlantic Coast Line railroad to the site. The Roquemore Gravel & Slag Co. of Montgomery, Ala., furnished the gravel, shipments usually taking 4 or 5 days in transit.

Either directly from the cars or from the stockpiles, the crane charged the Johnson 105-ton aggregate bin which was divided into two compartments. The aggregate was weighed on a beam scale in the 2-yard discharge hopper, which was filled twice in loading the truck-mixers with 4-cubic-yard batches. A 120-gallon measuring tank was built on the weigh platform at the aggregate bin, and water for the mix



C. & E. M. Photos

To pour the concrete beams and deck on pier 10, the Pumperete line ran up a "mule" or 12-foot-high tower (left) mounted on wheels which rode a wooden track set up on the forms. The 13-foot chute swung around to any angle in pouring the 30-foot-wide piers.

At right, a Marlow pump with a 2-inch hose is used to wash out the forms on pier 10 before concrete is placed.

was supplied through a 2 1/2-inch line from the supply at the Naval Base.

Six Smith truck-mixers, 4 and 5-yard models mounted either on Mack or

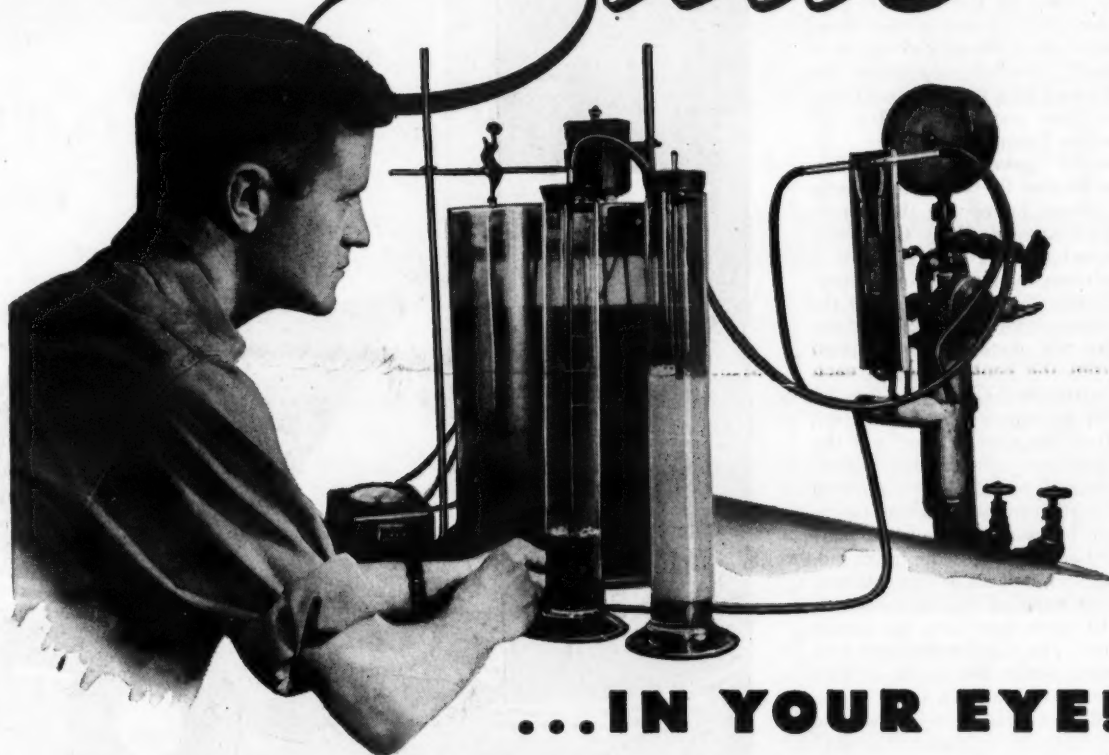
GMC trucks, backed under the bin to load sand, gravel, and water. Three hundred feet farther on they stopped at the cement house where bag cement

was unloaded into them by hand from a platform. Cement was supplied from four different sources: Lone Star and

(Continued on next page)

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Suds



...IN YOUR EYE!

The suds very much in your eye as you look at the photograph above is lubricating oil which foams badly and, if used in valuable equipment, constitutes a hazard to positive lubrication, which can increase maintenance costs.

At Sinclair Laboratories, skilled technicians, like the one shown above, study and test lubricating oils constantly for foaming characteristics. Through research in the study of additives, Sinclair provides anti-foam characteristics and assures positive lubricating film plus maximum heat dissipation for protection against wear and failure.

Through such painstaking research, Sinclair maintains production of lubricants of consistent high quality. Sinclair Laboratories and outstanding research are behind the dependable performance of all Sinclair Lubricants for Industry.

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OPALINE TBT OIL

Positive lubrication — Maximum power
For the long pull, under heavy loads

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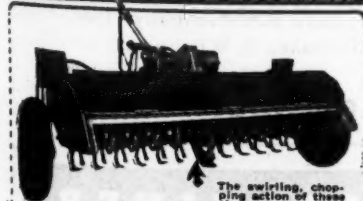
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and MANUFACTURING CONTROL = OUTSTANDING PERFORMANCE

**FOR SECONDARY ROAD
CONSTRUCTION ...
ARIENS AGGMIXER**



The swirling, chopping action of these lines does a thorough job of mixing, wet or dry.

HERE'S equipment designed especially for mixed-in-place construction—to operate in connection with other general purpose equipment. Wherever aggregates are used it thoroughly pulverizes, mixes and consolidates. Also ideal for soil cement stabilization. Safe and easy to operate. . . adjustable to any tractor . . . made in standard sizes, 4', 5', 6' and 7'. Write for details.

ARIENS COMPANY **BILLION WISCONSIN**

Piers Constructed For Naval Vessels

(Continued from preceding page)

Alpha at Birmingham, Ala.; Penn Dixie at Clinchfield, Ga.; and Florida Portland at Tampa, Fla. All cement was shipped by rail.

The batches were mixed a minimum of 5 minutes or 40 revolutions of the drums. The plant was owned and operated by the Ingram Concrete Co. of Jacksonville, Fla., which set it up to supply ready-mixed concrete for the job. The typical 4-yard batch (dry weights) of the 3,000-pound concrete with the aggregate gradation was as follows:

Cement	2,256 lbs.
Sand	5,200 lbs.
Gravel	7,744 lbs.
Water	117 gals.

Sieve Size	Per Cent Passing	
	Gravel	Sand
1-inch	95-100	.....
3/4-inch	25-60	.....
No. 4	0-10	95-100
No. 16	.....	45-80
No. 30	.....	5-30
No. 100	.....	0-8

Pumpcrete Used

The truck-mixers hauled the concrete 1 1/4 miles, on the average, to a timber ramp which was placed along the bulkhead near the pier about to be constructed. Moored alongside the bulkhead was a 60 x 30-foot steel barge on which was mounted a Rex 200 double 8-inch Pumpcrete.

The trucks backed up the shallow ramp and chuted the concrete directly into the 5-yard hopper on the Pumpcrete, which was driven by two Westinghouse motors off a 440-volt line. A 5-hp motor ran the agitator or re-mixing unit, while a 60-hp unit drove the concrete through the 8-inch line. Water for cooling the pistons was obtained from the river by a Marlow 2-inch pump set up on the barge and driven by a Wisconsin gas engine. A similar unit was used on the pier to wash out the forms before any concrete was placed.

The 200-foot sections were poured from the outboard end of the newly constructed forms, with the work progressing inboard towards the bulkhead. About 2,500 cubic yards of concrete was required for each of the 30-foot-wide piers; 3,410 yards went into the center 50-foot pier. The regular 200-foot sections holding about 300 yards of material were poured in from 5 to 6 hours.

As 1,200 feet was decided as the maximum distance to pump the concrete, this much of the piers was done first. Then the Pumpcrete barge was moved out 600 feet from the bulkhead and tied up along the pier. The truck-mixers backed out to this new location, and the remainder of the 1,845-foot piers was poured from that set-up.

The 8-inch line gained pier level from the barge by two 45-degree lifts and then made a right-angle turn to run out the center of the pier. To overcome vibration, an "expansion joint" consisting of a loop 12 feet high made with 45-degree bends was built into the line just after it started out the pier. The 10-foot sections of pipe were supported on wooden horses strung across the forms.

The usual procedure was to fill the beam forms with concrete for a distance of 30 to 40 feet before going back and pouring the deck. To reach all parts of the wide deck, the line ran up a "mule" or 12-foot-high tower mounted on four rubber-tired wheels which rode on wood planks laid along the wooden horses. From the top of the tower a 13-foot chute carried the concrete to the edges of the 30-foot piers; a longer 19-foot chute was used on the center pier.

As the concrete was placed, it was vibrated by a couple of Ingersoll-Rand air vibrators supplied with compressed

air from a 4 x 10-foot receiving cylinder located on the bulkhead near each pier. Two Worthington 210-cfm compressors with two similar receivers near-by kept all tanks charged through a 2-inch feeder line. The pours were handled usually by a 12-man crew consisting of a foreman, 5 puddlers, 2 on the vibrators, 1 to move the horses and wheel the tower to position, and 3 to handle the pipe line which was generally broken two sections at a time. In addition, 3 finishers first screeded the concrete with a wooden screed, and then gave it a further smoothing with long-handled bullfloats made of 1 x 6's.

Curing compound was used to cure the concrete. At the end of the day's run the pipe line was cleaned by forcing a "go-devil" plunger through it at 400-pound pressure generated by a Chrysler fire-pump engine.

Once the operations got under way, with only concrete and form work to be handled at the conclusion of the pile driving, a pour was possible nearly

(Concluded on next page)

FOR DUSTPROOFING UNPAVED ROADS

**SOLVAY
CALCIUM
CHLORIDE**



Clean
Odorless Colorless
Low Cost Easy to Use
Saves Surfacing
Materials

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"It's easy to get in with Pumpcrete!"

It's easy to place concrete in unusual or inaccessible locations with Rex Pumpcrete, the pump that pumps concrete through a pipe line. Jobs that could only be placed at prohibitively high costs with ordinary methods become simple with Pumpcrete's flexibility.

For example, where a structure jumps a river or gorge... where access roads are difficult to build or maintain... where traffic interference presents

a problem... where expensive preparatory work is required... Pumpcrete with its ability to transport on one or more levels, to elevate, lower and distribute concrete in one operation is the logical placing method.

For facts on how Pumpcrete can help you, see your Rex Distributor and write for your free copy of Bulletin No. 466. Chain Belt Company, 1666 West Bruce Street, Milwaukee 4, Wisconsin.

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REX

CONSTRUCTION MACHINERY



PUMPS



PAVERS



PUMPCRETES



MOTO-MIXERS



MIXERS

Piers Constructed For Naval Vessels

(Continued from preceding page)

every day. This was usually on a different pier so that the various sections could cure well before work was resumed on that particular pier. The big mass-concrete-production job moved smoothly along so that one pier was turned over to the Navy every two weeks when operations were at a peak. Numerous bits and cleats were then fitted into the concrete along the edges of the piers. Finally 55-foot creosoted-timber fender piles were driven on 4-foot centers and bolted to the sides of the piers to fend off the ships' hulls from the concrete.

Service Facilities

While the actual construction of the piers was completed in April, the various service facilities required to put the piers into operation will not be finished until this autumn. All of the eleven piers, which are numbered beginning at the downstream end, are supplied with ac power and some also with dc power. Berthing ships to house maintenance personnel will be tied up at some of the piers for which sewage facilities are provided. Behind the bulkhead a new sewage-treatment plant includes sanitation tanks, primary sedimentation tanks, digester, sludge-drying beds, digester tanks, and chlorination house to chlorinate the effluent before it is discharged. Both station and ship sewage are handled at this plant.

Two more boilers are being added to the existing powerhouse to provide steam for the piers berthing the personnel craft and for No. 6, the service pier, where repairs will be carried out. Four floating dry docks will be moored here to service the great inactive fleet.

Quantities and Personnel

The major items used in the construction of the eleven piers include:

Steel H bearing piles	4,990
Concrete	28,410 cu. yds.
Reinforcing steel	2,850 tons
Treated fender piles	9,810

The Merritt-Chapman & Scott Corp. contract amounts to \$6,600,000. Of this sum, the pier construction amounts to \$4,350,000, and the remainder will be expended on the pier facilities. The contractor was represented at Green Cove Springs by Charles A. Richardson, Project Manager; Stanley Ibenhal, Assistant Project Manager; E. L. Olsen, General Superintendent; and Monroe E. Sloane, Concrete Foreman. The Ingram Concrete Co. was represented by J. M. Barker.

For the Bureau of Yards and Docks, Captain C. G. Smallwood, (CEC) USN, is Resident Officer in Charge of Construction, assisted by Lt. Commander R. R. Wooding. B. A. McConnel is Chief Inspector on the project, and Lewis A. Holborn is Chief Engineer.

Rock-Bit-Grinder Bulletin

A bulletin describing its line of rock-bit grinders is available from the Alloy Steel & Metals Co., 1862 E. 55th St., Los Angeles 11, Calif. Bulletin No. 127 features a description of the Model A-1 grinding attachment, the Model G-8 gasoline-driven unit, and the Model E-7-B electrically driven unit.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 65.

Six-Wheeler-Truck Line

A folder about its line of heavy-duty M6x6 trucks has been prepared by The Four Wheel Drive Auto Co., Clintonville, Wis. Feature of Bulletin No. 473 is a large drawing which shows the

major parts of one of these six-wheel trucks superimposed on a drawing of the truck itself. The relationship of the various parts to each other is shown in this manner, also the purposes of each.

Individual sections are illustrated: the double-reduction front axle, the heavy-duty steering and driving ends, the frame and cab, and others. Also described in detail is the FWD power-proportioning differential.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 87.

Weed-Killer Unit

A spray unit for use with liquid weed killers has been developed by the J. A. Park Machinery Co., P. O. Box 1532,

Pueblo, Colo. Called the Weed-O-Matic, it is designed for use in controlling weed growth along highway right-of-ways.

The unit is said to deliver an even concentration of spray at 30 to 40-pound pressure with a spray coverage at ground level of from 4 to 20 feet. Spray jets are spaced at 18-inch intervals staggered at 10-degree offsets. Spray is controlled by a valve at the left hand, leaving the right hand free for operating the spray bar.

The Weed-O-Matic is furnished with an adjustable hitch which is designed for use with most trucks or tractors. Recommended operating speed is 5 to 7 mph. The unit is made in a 750-gallon size; there is also the Weed-O-Matic Junior with a 300-gallon capacity. The

larger unit is mounted on a two-wheeled trailer; the Junior is skid-mounted.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 21.

Hydro-Line Sales Agents

Three sales representatives for its line of air and hydraulic cylinders and special machinery have been appointed by the Hydro-Line Mfg. Co., 711 19th St., Rockford, Ill. They are Harry B. Ribbel, Arlington, Mass.; John S. Diefenbach, 217 Westfield Ave., Ansonia, Conn.; and R. E. Hayden, 200 Lumber Exchange, Minneapolis, Minn. They will have exclusive sales rights in their respective territories.



BUDA

Supercharged

DIESEL

provides *RUGGED POWER*

for the new

LaPLANT CHOATE

MOTO-SCRAPER



6-cylinder

MODEL 6-DCS-844

225 Horsepower

featuring:

- ★ fast starting
- ★ high torque
- ★ slow-pressure combustion
- ★ low upkeep
- ★ long life
- ★ clean exhaust

BUDA

WORLD-WIDE
SERVICE
AND PARTS

Write for your copy of the new illustrated BUDA Catalog describing the use of BUDA Diesels in all types of highway and off-highway equipment. Ask for Bulletin 1332.

BUDA

15412 Commercial Avenue
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After a series of comprehensive tests LaPlant-Choate Mfg. Co., Inc. selected the BUDA 6-cyl. Supercharged Diesel Model 6-DCS-844 as standard motive power for their new high-speed MOTO-SCRAPER. This powerful, high-torque, compact engine provides the kind of rugged, trouble-free power LaPlant-Choate customers need for their toughest earthmoving jobs.

Follow the example of the leading construction equipment manufacturers... specify BUDA power-proved Diesels for low cost, long term service.



National Safety Council Photo

Eye appeal is important in your safety message. This National Safety Council poster is designed to get the men to take a look—and it does make a point for accident prevention too.

Put Some "Pep" In Safety Program

Management Must Show Its Continued Concern; Measures Must Be Tied to Employees' Interests and Welfare

★ TO anyone who has watched active construction jobs, it is obvious that many contracting firms and their employees have a long way to go before they can be described as safety-minded—despite the continuing campaign for safety. This suggests that there is something lacking in our accident-prevention programs.

The reasons for safety measures are so obvious that they should need no programs or "selling". But in an industry where hazards are all too familiar, that very familiarity breeds contempt. And that contempt, that disregard for hazards, that casual acceptance of accidents as part of the business are the safety-record enemies we must combat. They are the reasons we have to "sell" safety.

John E. Braun, Assistant Supervising Engineer of the Aetna Casualty & Surety Co., suggested to the Seventeenth Annual Convention of the Greater New York Safety Council some selling steps which should pep up the safety program and arouse greater interest in accident prevention. He pointed out first of all that a continuing concern on the part of management is vital to safety practices and is the impetus for the entire program. The employees' knowledge of this management concern is equally important.

Sustaining Employee Interest

To arouse and sustain employee interest in safety, Mr. Braun said, we

must recognize this basic psychological fact: a normal person's first interest is self. Therefore, we must evaluate all the means we use according to how much they appeal personally to the greatest number of employees.

Second, anyone's interest is aroused by association with familiar things both in his home life and on the job. Third, the means used to arouse interest must be easily assimilated, easy to remember, and so presented as to satisfy a personal need. In a great many instances that feeling of need may require stimulation before the means of satisfying it is presented. That this can be done is proved by any number of advertising campaigns. The same kind of psychology is needed to sell safety.

Try Something New

Various ways to stimulate interest have been used in safety programs for many years. In fact, we have allowed them to become stereotyped, Mr. Braun said, and so have destroyed to a great extent their usefulness. Bulletin boards



National Safety Council Photo

Dressing up jumbo poster boards proves that management wants to put safety over. Originality helps too.

have degenerated in eye appeal to a point where not one worker in fifty ever

glances at the posters. Charts and graphs showing safety records are allowed to become stale. In doing this, we have made a double mistake. Not only is the present tool becoming useless, but the possibility of using it effectively in the future is diminished.

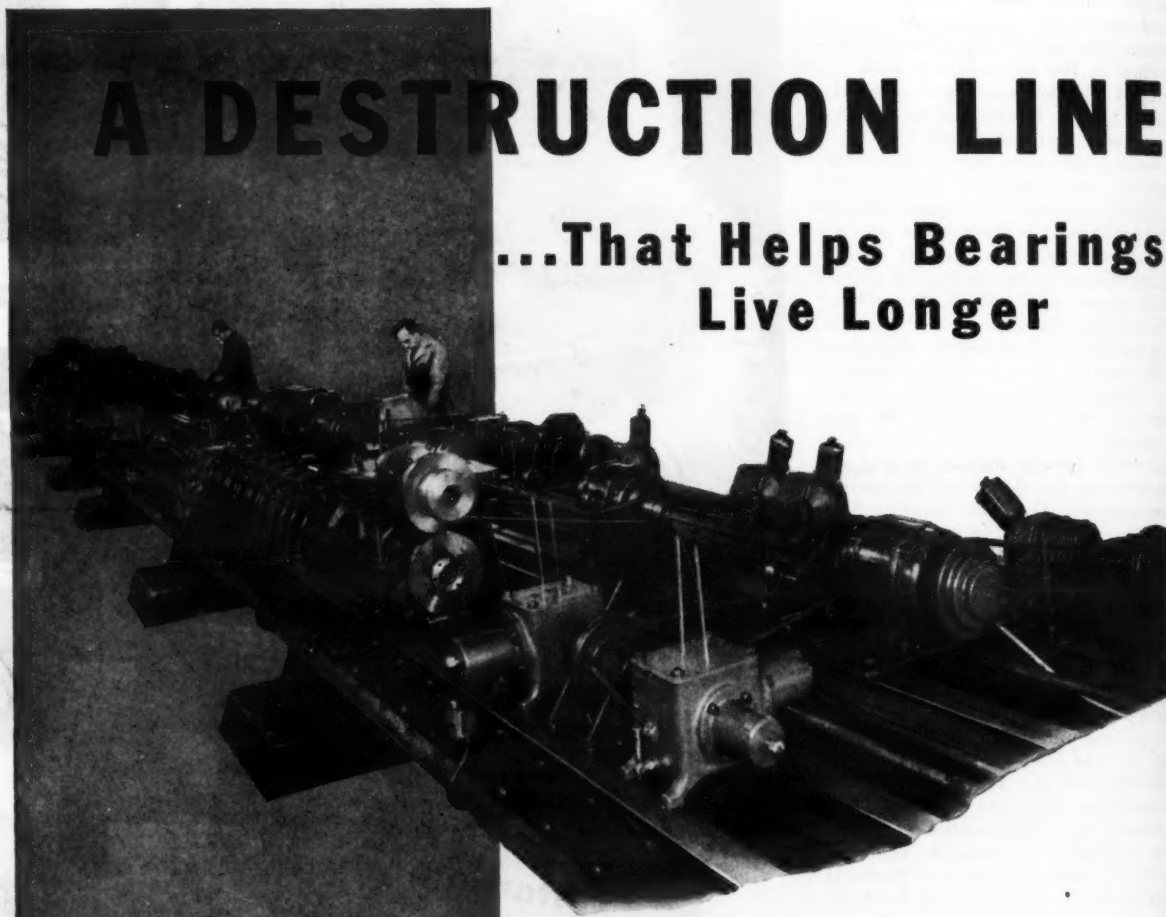
Mr. Braun believes that these mistakes have been caused by insufficient planning of what is needed to create interest in safe practices. Each industry, in fact each job, should be studied to determine its hazards and the needs of its safety program. Then the campaign should be carefully mapped out and checked against those needs. All the necessary groundwork should be completed before any move is taken to set the scheme in motion. It is only through such complete analysis, careful planning, and strong follow-through, that interest-provoking schemes will produce results, Mr. Braun believes.

The Safety Committee

One of the most widely used means of (Continued on next page)

A DESTRUCTION LINE

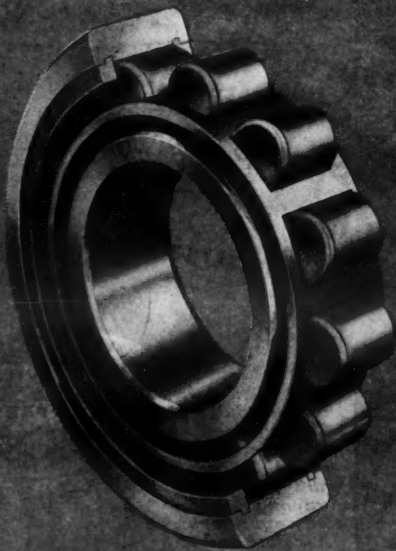
...That Helps Bearings Live Longer



Supplementing the many eagle-eyed process inspections that each Hyatt Roller Bearing receives—beginning with raw material and following through every manufacturing operation—is our Destruction Line, pictured above.

Here bearings picked at random from the production line are placed in testing rigs which scientifically emulate the actual operating conditions of the bearings. They are kept running to the point of destruction.

Thus we can see ahead through the years what is expected of the bearings for the job they are designed to do. This pre-determined quality—plus such Hyatt features as inter-changeability of parts, to facilitate assembly; and maximum capacity for a given space permitting more efficient product design—combine to make Hyatt first choice of experienced designers. Years of care-free application have proved the wisdom of their choice. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.



THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE WORLD

The Biggest Little Motors in the world for use where power is not practical, available, or sufficient.

2-Ton "Lightweight"	75 ft. 14"
5-Ton "General Utility"	250 ft. 14"
15-Ton Triple-Geared "Special"	1200 ft. 14"
With patent gear change and positive internal brake that never fails, and will lock load.	
Gear Ratios	
2-Ton 4 & 22 to 1	Weight Price
5-Ton 4 & 24 to 1	60 lb. \$ 70
15-Ton 4, 19 & 100 to 1	110 lb. \$ 90
	680 lb. \$ 250

BEEBE BROS.

2724 6th Avenue So. Seattle 4, Washington

HYATT ROLLER BEARINGS



National Safety Council Photo

The Associated General Contractors of America is one of several organizations working to prevent accidents in construction. Every job which earns the right to post this Scotchlight sign, put up by the National Safety Council, advances the industry towards a better safety record.

Putting Some "Pep" Into Safety Program

(Continued from preceding page)

generating interest and producing results in accident prevention is the safety committee. The size of such a committee, the number and size of subcommittees, and the frequency of meetings should be based on the characteristics and needs of the particular project. In all instances, in fact, if such committees are to fulfill their interest-arousing function, they must be tailored to fit the particular requirements of the job.

Mr. Braun also suggested that a cardinal point in the success of a safety committee is steady attendance at the committee meetings by someone who the employees know speaks and acts for management. Without such active backing by management, interest rapidly wanes.

The time of committee meetings should be arranged so that all members are free to attend. Meetings should be frequent enough to maintain interest. It is better to keep them short and snappy than to plan too-long programs which prove to be tiresome rather than stimulating.

Rotation of membership on the safety committee is highly desirable. It brings the greatest number of employees into activity in the accident-prevention program. But Mr. Braun warns that membership should not be shifted too often, or members will not serve long enough to become thoroughly imbued with the idea of safety and support the program.

Too many safety-committee meetings consist merely of reading minutes of the previous meeting and discussing suggestions or recommendations already presented. An effort should be made to present at each meeting one new topic, to bring a new thought to the committee members, and give them something definite and fresh to carry with them back to their jobs and their fellow workers. Novelty will help a great deal to maintain interest in both the meetings and the program.

Safety Posters

Safety posters also are commonly used forms of safety education. But it is obvious that merely pasting a poster on the wall or bulletin board never prevented an accident. In order for any tool to be useful, we must keep it sharp, Mr. Braun said. Therefore, suitable bulletin boards must be provided. They need not be elaborate but they should be, in themselves, of a nature which calls attention to their messages. Again, the number and location of bulletin boards should be carefully studied and planned. They must be so located as to

catch the eye of the greatest number of employees. And they must be in a position where an employee can stop for an instant and read the message.

In all cases, the board should be in the complete care of a designated person or group of persons specially selected for the job. Of course, the safety poster or literature should be carefully chosen for its eye-catching appeal. Mr. Braun suggests using a minimum of material at one time, and changing it often. Posting of job news or items of interest on the bulletin board along with the safety material induces reading and brings results.

Obviously all safety material available will not be suited to the particular job. Be selective, so that the material used has direct application to the men who see it. Some thought should be given to special safety displays. People are always interested in things with which they are familiar; for example, job pictures of good and bad practices aren't difficult to secure and can be used most effectively. It goes without

saying that all material used must be interesting and in good taste.

Safety Literature

Mr. Braun reported that the distribution of National Safety Council instruction cards and folders and other safety literature has very encouraging results if handled properly. One method of handling it, where there is a safety committee, is to look over and discuss

the literature at committee meetings. When it is agreed that the particular literature fills a need and has a real message for the men on the job, it can be distributed by the committee members to the groups they represent. This method is much more successful, Mr. Braun said, than distributing the literature without any kind of build-up.

In all cases, a desire for the information (Concluded on next page)

UNINTERRUPTED WINTER TRAVEL

is Assured by

DAVENPORT - FRINK SNO-PLOWS



ALL TYPES AND SIZES

DAVENPORT BESLER CORPORATION

Made in Eastern U.S.A. by CARL H. FRINK.

Dept. A
DAVENPORT, IOWA
1000 Islands, CLAYTON, NEW YORK

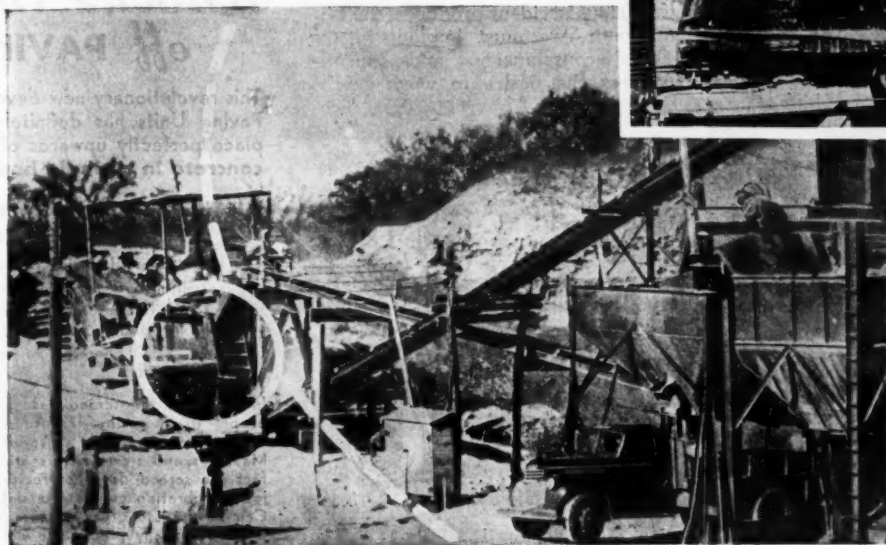
PLAN NOW for NEXT WINTER. No matter what the snow or ice conditions, you obtain FASTER, SAFER, CLEANER snow removal with the lighter, yet stronger DAVENPORT-FRINK SNO-PLOWS. Available in "V" and Straight Blade types for all sizes of trucks, tractors, road patrols and locomotives. Be ready. Buy early. Write us for complete information.

A DUAL IMPACT ACTION FACT

MAINTENANCE COSTS DOWN 25c PER TON...

The machine: New Holland Double Impeller Breaker...
The place: Dillon, Sharpe & Co., Columbus Junction, Iowa...
The production record:

"... well over 150,000 tons of quarry run material with this single Breaker and maintenance is practically nil. Previous conventional equipment incurred a wear factor of 28 cents per ton. Under identical conditions, we now operate the New Holland Breaker with a wear factor of 3 1/2 cents per ton." Signed: W. F. Sharpe.



It's a power saver, too. High fines production is demanded in this Iowa quarry... that means stepping up impeller speeds. Even at 1000 r.p.m. these finely balanced impellers used only 80 h.p. each... producing 100% aggregate passing 1" screens, 65% passing eight mesh.

Simple Breaker adjustments give you any size aggregate you want... from ag lime to road ballast. For complete details, write Dept. T-5, New Holland Manufacturing Company, Mountville, Pa.

NEW HOLLAND DOUBLE IMPELLER BREAKERS

PRIMARY AND SECONDARY CRUSHING IN ONE OPERATION



Putting Some "Pep" Into Safety Program

(Continued from preceding page)

tion must be created if the employee is to accept and assimilate it. Many firms incorporate safety rules in their employee instruction booklets. However, it is not enough to pass out these booklets and ask the men to read them. In order to get the greatest effect from such booklets each group of new men should spend some time with the safety director, or the foreman or superintendent to whom they are responsible. At this time the rules should be read and compliance with them discussed, stressing not only the benefit to these men themselves but also to their fellow-workers. Usually the explanation of the need for a safety rule means the difference between compliance and non-compliance on the part of an individual worker.

Publication of safety items in house organs or company bulletins can serve a good purpose, but only if properly handled. In the first place, the items should be given a place of prominence. It is bad psychology to relegate safety material to a back page. It is also important that they be well written, concise, and interesting, and they should be tied as closely as possible to something with which the reader is familiar.

Movies and Slides

The value of visual education by means of films, slides, etc., was demonstrated during the training-for-war days. Their appeal is universal and the very method of presentation makes them easily understood and absorbed. But if films are to be used in a safety program, they must be carefully selected to be sure that their message has direct application to the job and an appeal to the particular group to which they are being shown.

Contests

In considering contests and their value in pepping up a safety program, Mr. Braun believes that they must be very carefully worked out and publicized so that every employee is aware of what is taking place. The contest period should be long enough to give fair results but not so long as to make



National Safety Council Photo

The project bulletin board offers an excellent opportunity to "plug" safety. Here an announcement to employees is surrounded by safety reminders.

it difficult to keep interest up to the proper pitch.

Contests in the construction industry are rather difficult to conduct properly, and the greatest care must be exercised in their planning to be sure of getting results.

Individual Attention

Although the group activities discussed thus far are essential to a safety program, some approach to the individual must be made. It can be made in several ways. On most construction jobs, the engineer or superintendent responsible for safety is either personally acquainted with the men on the job, or knows the foremen and can work through them. On projects of any size, small group consultations on safety which grow out of an accident investigation within the group affected can bring forth suggestions and ideas that normally remain hidden within the individual.

The personal supervision which is possible on construction projects, where the foreman or superintendent can observe unsafe practices and call the men's attention to correcting them, is a highly effective means of promoting safety. But it depends on the interest in safety which has been aroused in the foreman or superintendent. That takes us back to management where the safety program must start.

It is self-evident that to get at our most serious accident producer, the human factor, we must implant in the workers' consciousness and subconsciousness the desire to work safely.

This can be done, if we get the individual interested enough. Evidence of management's interest in the welfare and safety of its employees, and proper merchandising of safe practices should

bring gratifying results in our perpetual battle against accidents.

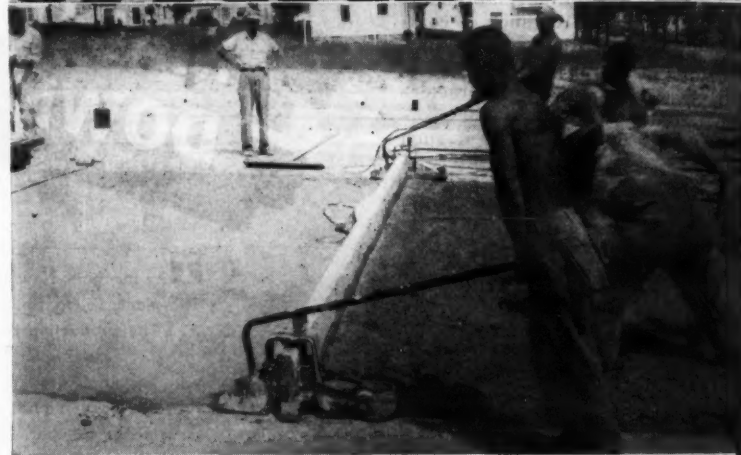
Power-Shovel Features

A two-color 40-page bulletin on the P&H No. 1055 shovel has been put out by the Harnischfeger Corp., Excavator Division, 4400 W. National Ave., Milwaukee 14, Wis. Bulletin No. X-104 features several large photographs depicting the shovel at work in quarries, on irrigation projects, and other jobs.

The bulletin describes the Magnetorque electric swing, simplified hydraulic controls, independent holding brakes, the P&H planetary-gear arrangement, etc. Numerous full-page pictures are used to illustrate the construction and operation of these features. Also included is a double-page spread showing the No. 1055 shovel equipped with extra-long crawlers for long dragline operations.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 24.

JACKSON MUNICIPAL PAVING UNIT



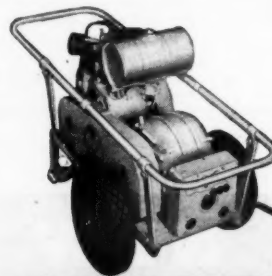
Knocks the Socks off PAVING COSTS!

This revolutionary new development in Municipal Paving Units has definitely proved that it can place perfectly upwards of 65 cubic yards of concrete in a single hour!

FURTHERMORE, IT EMPLOYS THE ONLY SCREED THAT WILL:

1. Undercut at side forms,
2. Roll back for second pass.
3. Strike-off crowns, both regular and inverted.
4. Permit operators to work from front, rear or sides.

In addition, the screed has such a strong tendency to propel itself in the forward direction that only small effort is necessary to strike-off stiff mixes of concrete. Manholes and storm sewers are no handicap due to the fact the screed does not reciprocate. Does an excellent job of vibrating concrete in slab depths up to 10 inches. Can be used to great advantage on any slab width from 6' on up to any practicable width. For radically reduced costs and far greater production, by all means write for complete details of this remarkable paving unit RIGHT NOW!



MODEL M-1 POWER PLANT

furnished with Model SC200 Screed. Capacity: 1.25 K.V.A. Generates both single phase and 3-phase 110 Volt 60 Cycle AC. Also ideal for operating lights, vibrators and powers tools.

The COMPLETE UNIT CONSISTS OF:

1 The Model SC200 Screed (for slabs up to 16' wide) or Model SC202 (for slab widths from 16' and up) — actuated by the famous JACKSON Vibratory motor. Light weight, easily transported — quickly converted from one slab width to another.

2 One of our famous Portable Power Plants which provide a wide range of vibratory frequencies thus assuring perfect placement of any concrete mix usually specified. These husky plants are Wisconsin engine powered and have permanent magnet generators which require no adjustment or maintenance.

The REAL MEASURE of ENGINE VALUE is "H. P. HOURS" of POWER SERVICE

It isn't the original H.P. rating of an engine that counts but rather, the number of H.P. Hours of power service it will deliver during its lifetime. This, in the final analysis, is the real measure of engine value.

Wisconsin Air-Cooled Engines deliver the most H.P. Hours because they are designed and built for rugged, heavy-duty service. For example: every Wisconsin Engine, from the smallest to the largest, runs on Timken tapered roller bearings at both ends of the crankshaft to take up end-thrust and provide the best protection against bearing failure... at the same time assuring a smooth-running engine. This is just one typical detail that stands back of "Most H.P. Hours" of on-the-job power service.

You can't go wrong if you specify "Wisconsin Air-Cooled Engines" to meet your power requirements, within a 2 to 30 hp. power range.



Wisconsin Engines are available in a complete range of types and sizes (all 4-cycle) from 2 to 30 hp.

WISCONSIN MOTOR Corporation

MILWAUKEE 14, WISCONSIN

World's Largest Builders of Heavy Duty Air-Cooled Engines

ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON MICHIGAN



The 315-pound Sureweld dc arc welder can be brought close enough to the job so that only 20 feet of cable is necessary. This results in a minimum loss of amperage, says Hollup Corp.

Portable Arc Welder Weighs 315 Pounds

A lightweight gas-driven dc arc welder is being mass-produced by the Hollup Corp., a division of the National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill. The Sureweld weighs 315 pounds and can be mounted on pneumatic wheels if desired.

The generator is a four-pole self-excited type with interpoles. The welder is rated at 150 amps at 30 volts on 50 per cent cycle. It has a 4-cycle 2-cylinder opposed-design motor. An air-cooled turbine-type fan provides cooling. The manufacturer states that there is a minimum loss of amperage since the welder can be brought close enough to the job so that only 20 feet of cable is necessary.

The welder is 32 inches long, 26 inches wide, and stands 28 inches high. Electrodes up to and including 5/32 inch and certain types of 3/16 inch may be used with the welder. Two receptacles for extension cords on the machine provide for emergency lighting.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 18.

New 1947 Truck Line

The 1947 line of GMC trucks has been put on display by the GMC Truck & Coach Division of the General Motors Corp., Pontiac, Mich. The new light and medium GMC's feature entirely restyled grille, hood, and fenders, larger all-steel cabs designed for increased visibility and greater driver comfort, stronger front and rear axles, heavier frames, and many engine improvements.

The new cabs are 3 3/4 inches longer and 9 1/2 inches wider than previous models. Seat cushions are said to have almost double the previous number of coil springs. De luxe cabs, optional on the 1/2 to 2-ton models and standard on the 2 1/2 to 3 1/2-ton models, have rear-quarter corner windows for increased visibility.

In the chassis, clutch, brake pedals, and steering column are mounted on the frame to lessen vibration and permit easier servicing.

Chassis improvements also include a dash-mounted power-shift control, standard on all models employing two-speed rear axles; hypoid rear axles for 1/2 through 2-ton models; banjo-type housings for the 1 through 2-ton group; larger wheel bearings and tubes on the rear axles of the 1 1/2 and 2-ton range; and stronger frames for the 1 through 3 1/2-ton models.

In power plants, the new light and medium-duty lines offer three GMC-built engines of valve-in-head design. In the heavy-duty lines, the horsepower of the 308 and 361 gasoline engines has been stepped up approximately 10 per cent; that of the four and six-cylinder

diesels has been increased by 21 per cent.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 49.

Wooden Conduits Serve As Culverts, Drains, Etc.

A 24-page catalog describing the Laminex design for culvert, drain, and sewer construction has been issued by the Wheeler Lumber Bridge & Supply Co., Old Colony Bldg., Des Moines 9, Iowa. The Laminex laminated and interlocking design is said to form pressure-treated creosoted wood into a solid conduit for use as storm sewer, railroad and highway culvert, airport and industrial drainage, and similar uses.

Bulletin No. 200 lists the general specifications and construction design, and the results of laboratory tests for strength. It diagrams and pictures installations in the field, installation features, and special designs—twin, triple,

quadruple, broken-back, drop-inlet, and skew.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 56.

Cataphote Ups Williamson

John Williamson has been appointed Manager of the Cement Products Division of the Cataphote Corp., Toledo,

Ohio. The company is distributor of Darex AEA, air-entraining agent, in Ohio, Michigan, Indiana, and Kentucky.

Help Prevent Fires

October 5-11 has been designated as Fire Prevention Week, to remind us to cooperate in the prevention of the 1-700,000 fires which otherwise will kill 11,000 Americans this year.

MARVEL

CONCRETE VIBRATORS

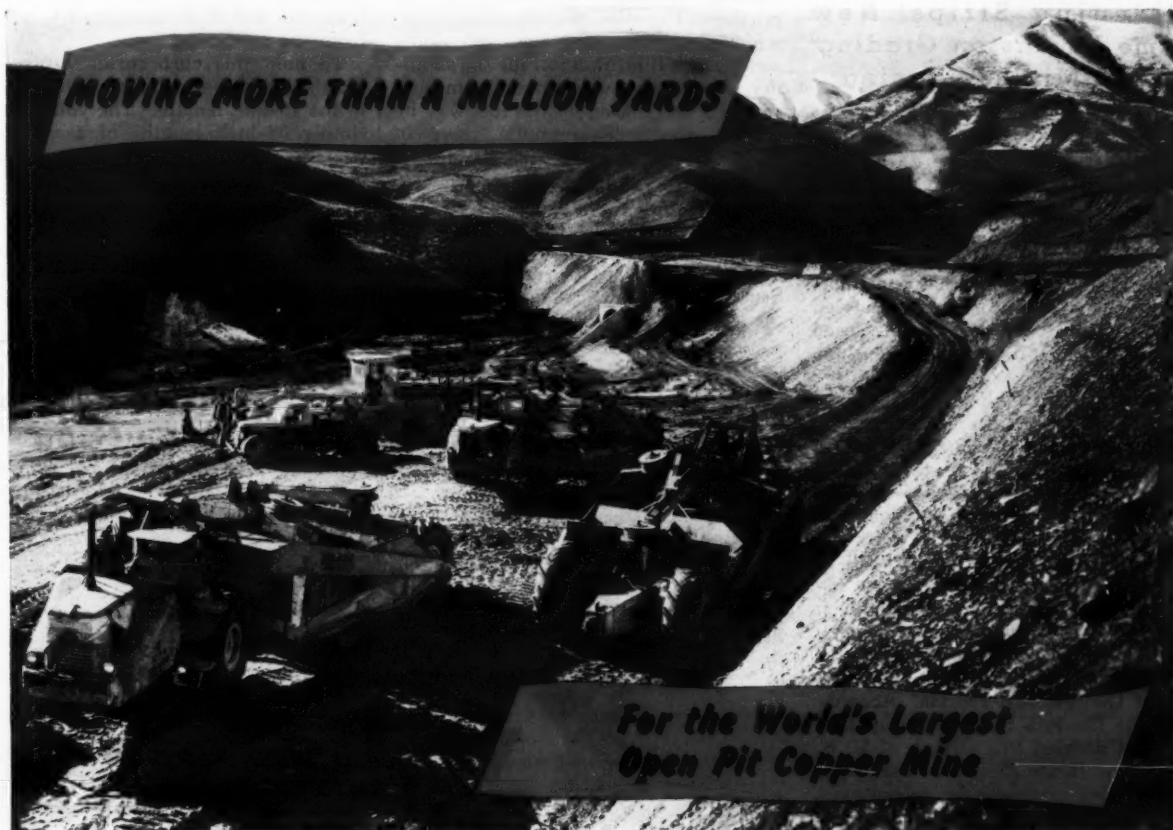
also

Asphalt and Tar Kettles
Portable Hoists
Generator Sets
Utility Saw Rigs
Utility Torches

WRITE FOR DETAILS

Marvel Equipment Company

224 S. Michigan Avenue
CHICAGO 4, ILLINOIS



UTAH CONSTRUCTION COMPANY JOB, BINGHAM TO GARFIELD, UTAH

—With a Fleet of Wooldridge Terra-Cobras



WOOLDRIDGE TERRA-COBRA employ the same Bowl feature as Wooldridge "Terra-Clipper" tractor-drawn Scrapers

Enlarging the railroad access road to the world's largest open pit copper mine near Bingham, Utah, a fleet of six Wooldridge high-speed heavy-duty Terra-Cobras teamed with six rugged Terra-Clipper scrapers to move more than a million yards of dirt, rock and gravel. Under hot and dusty as well as cold and muddy operating conditions, Terra-Cobras handled capacity loads at speeds up to 17 M.P.H. on round-trip hauls from 2000 to 12,000 feet. Ample power, high speed, positive traction, and effortless hydraulic two wheel steering control assure the Terra-Cobra's high production performance at lower costs per yard. For faster earthmoving on long and short hauls, investigate Wooldridge Terra-Cobras. Write today for full details.

Measure Each Job in terms of WOOLDRIDGE EQUIPMENT:

- ★ High Speed
- ★ EARTHMOVERS
- ★ Tractor-drawn SCRAPERS
- ★ BULLDOZERS
- ★ TRAILBUILDERS
- ★ RIPPERS
- ★ POWER CONTROLS

WOOLDRIDGE MANUFACTURING CO.
SUNNYVALE, CALIFORNIA
NATIONWIDE SERVICE

WOOLDRIDGE

TERRA COBRA

HIGH SPEED SELF PROPELLED
EARTHMOVERS



C. & E. M. Photo
During grading for the widening operations north from Darien, Ga., one of the new electrically controlled Tournapull CG's dumps a 15-yard load of borrow from an EL6 Carryall onto the shoulder.

Busy Road Widened, Given New Surfacing

Truck-Mixed Concrete for Widening Strips; New Prime Movers on Grading; Plant-Mix Resurfacing

♦ COASTAL Highway U. S. 17 south of Savannah, Ga., is one of the most heavily traveled roads in the country during the winter months. Then the tourist trade rushes back and forth between the northern climes and the resort sections in the south. Last winter U. S. 1, the next paralleling north-south highway to the west in this region, carried practically no traffic because of closed sections and long detours around Alma, Ga. So the bulk of this travel used U. S. 17 which follows closely the Georgia coast. But despite this heavy traffic, an important improvement to a 23.4-mile stretch was started last November; it began at Darien and extended northwards towards Savannah.

The original road is over 20 years old. It was built of concrete with an 8-6-8-inch cross section, but with only an 18-foot width. For a long time, it has been much too narrow to handle the high-speed traffic using this important through route to the southern resort area of Georgia and Florida. Accordingly the Georgia State Highway Department divided this stretch of U. S. 17, or State Route 25, into two sections, and awarded contracts for reconstruction.

Section 5 began at the north city limits of Darien in McIntosh County and ran north for 13.3 miles. There Section 4 began and continued about 10 miles farther to within 3½ miles of the town of Riceboro in Liberty County, about 36 miles below Savannah. The entire project was widened on each side with a 3-foot strip of concrete 7 inches thick, followed by a bituminous plant-mix surface over the entire 24-foot width of pavement.

On the lower section the original 3-foot shoulders were replaced. (However, plans for second-stage construction on Section 5 included final grading

to provide 10-foot shoulders and extending drainage structures.) On the northern 10 miles the shoulders were widened to 10 feet with 4 to 1 side slopes to the ditch line. Material for the shoulder construction was moved from borrow pits and placed on the roadway by a fleet of six Tournapulls, three of which were the latest models equipped with electrically operated controls.

Contracts for both sections were awarded to S. J. Alexander, Inc., of Thomasville, Ga., on low bids of \$464,000 and \$450,000 respectively for Sections 4 and 5. A subcontract for the grading on Section 4 was subse-

quently given to Pickering & Wilkerson Construction Co., of Atlanta, Ga.

Concrete Widening

To hold the 3-foot widening strip of concrete, a 5-foot trench 7 inches deep was dug by an Adams motor grader; its 12-foot blade was so angled that the material was slid from the excavation down the slope. The cut was made with such precision that no rolling of the trench bottom was necessary.

On the job were 3,000 feet of Blaw-Knox 9-inch steel forms, of which 1,500 feet were usually kept ahead of the pouring operations. In the 10-hour work day an average of 1,500 feet of trench pour was completed, using 150 cubic yards of concrete. The forms were removed after 24 hours and moved ahead.

Onto the outer edge of the 3-foot x 7-inch widening strip, a 2¼ x 6-inch header of concrete was constructed. This served as a form in retaining the bituminous material used in the surfacing. The header or curb was built by laying a 2¼ x 6-inch wood form in 10-foot sections on top of the freshly placed concrete and at a distance of 6 inches from the steel road form.

To hold this curb form in place a wooden yoke was placed at the joints in the 10-foot lengths. The yokes were simply 18-inch lengths of 1 x 3's to which were nailed two 2 x 2-inch cleats on the same side and 10 inches apart. One end of the yoke was placed against the old pavement and the other against the header; thus holding it in position until the curb had its initial set; after that the yokes were removed.

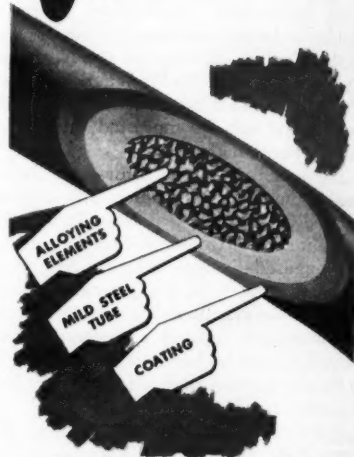
The concrete was hauled from a

central batch plant by the Glynn Construction Co., of Brunswick, Ga., on a subcontract; it was paid for on the basis of cubic yards delivered to the forms. Five truck-mixers were employed on the job: a Smith 4-yard, two Smith 2-yard, and two Jaeger 2-yard units all mounted on Ford trucks. Mixing time was at least 10 minutes. The concrete was chuted directly into the forms as the truck-mixers moved slowly along
(Continued on next page)

The New COATED STOODY SELF-HARDENING

keeps earth-moving equipment

On the Move



- Excellent Arc Characteristics
- AC-DC Application
- No Slag Interference
- Self-Lifting Slag
- Solid, Dense Deposits
- Wide Amperage Range on Welding
- Rapid Deposition Rate
- Complete Uniformity
- Freedom from Moisture Absorption
- Can be Welded in All Positions
- Same Hardness and Wear Resistance on Multiple Deposits

Try this low-cost hard-facing alloy on all equipment subject to severe impact and abrasion. 3/16" and 1/4" rod diameters priced at 50c per lb. F.O.B. Whittier or Dealers' Warehouse. Over 600 U. S. Dealers.

Free Guidebook

Shows 125 proven applications for retarding wear and increasing equipment life with Stooddy Self-Hardening and other Stooddy Alloys. Sent free—write today.

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1136 W. SLAUSON AVE., WHITTIER, CALIF.

STOODY HARD-FACING ALLOYS
Retard Wear • Save Repair

THE
AMERICAN RED CROSS

Carries On!

GIVE!

You Can't Beat Welded Construction



WELLMAN Williams Type BUCKETS

Wellman pioneered welded rolled steel construction for longer life and greater service. It's the extra strength that gives the extra, low-cost digging power. Whatever your requirements... whether for Multiple Rope, Power Arm, Dragline, Power Wheel or Special Service—specify Wellman! ¾ to 16½ yd. capacity.

SEND FOR BULLETIN

THE WELLMAN ENGINEERING CO.
7012 CENTRAL AVENUE • CLEVELAND 4, OHIO

MARTIN CARRYHAUL TRAILERS
TRADE MARK REGISTERED



Your "CATERPILLAR" Dealer is your MARTIN Dealer. See him for your trailer needs.

MARTIN MACHINE COMPANY
KEWANEE, ILLINOIS

MARTIN CARRYHAUL TRAILERS "Make Hauling A Pleasure!"

Ease of loading, dependability and economical operation are three Martin CARRYHAUL Trailer characteristics which make them the leaders in the field. Regardless of your hauling job, there's a proper size Martin CARRYHAUL Trailer to do it for you safely and economically.

Busy Road Widened, Given New Surfacing

(Continued from preceding page)

one side of the road while traffic was maintained on the other side.

Leveling off was done by two men using a 5-foot wooden "charley horse" screed followed by a hand bullfloat. The latter was made from a 3-foot length of 1 x 8 attached to a 5-foot handle. When this floating was completed, the curb form was set and concrete was carried back in a wheelbarrow and shoveled into the narrow header slot. The top of the curb form was given a float finish and later edged with a 1/2-inch-radius tool. Curb pouring was kept right up with the main trench pour and never lagged over 100 feet behind.

Expansion joints of 3/4-inch asphalt-impregnated felt were set on 300-foot centers and a dummy contraction joint made every 30 feet. Slots for the latter were made with strips of 1/4-inch steel, 3 feet x 2 1/2 inches. Kapco membrane compound, applied at the rate of 25 square yards to the gallon with a hand spray unit, was used for curing the mix.

Batch Plant

As the widening was done first on the southern section, the concrete batch plant was set up in a clearing on the east side of the road about midway of the lower contract. Aggregate, both coarse and fine, was delivered to a siding of the Seaboard Railroad at the town of Townsend, about 6 miles west of the batch plant. Stone was supplied by Weston & Brooker Co., at Camak, Ga., some 200 miles away. Sand came from the Dawes Silica Co., at Forest Park, Ga., over 300 miles distant.

When the material was received in bottom-dump cars, a conveyor belt was used for unloading; when gondola-type cars were employed, a crane with clamshell bucket removed the aggregate. The sand and stone were loaded to a fleet of six trucks—Fords, Macks, and Whites—owned by H. G. Spence of Thomasville, Ga., who was given a hauling contract on the basis of so much per yard hauled.

At the plant the material was stockpiled and then transferred to an Erie AggreMeter of 104-ton capacity. It was divided into two compartments, one-third of the total being for sand and the remainder for stone. The material was handled by a Northwest crane equipped with a 48-foot boom and a Haiss 5/8-yard clamshell bucket. A Caterpillar RD6 tractor-dozzer pushed the aggregate to the crane. A Buffalo beam scale at the batcher was used to weigh the material.

Bag cement was purchased from the Lehigh Portland Cement Co., at Birmingham, Ala., and shipped to a siding of the Seaboard Railroad at Riceboro where the asphalt plant was also located. From there it was hauled 16 miles to the concrete batch plant by a GMC trailer transport truck carrying 300 bags at a time.

The cement was unloaded by hand to a timber platform into which a metal hopper was built. The truck-mixers drove under the platform to pick up



C. & E. M. Photo

At the batch plant for the 23.4-mile Darien job, a Northwest crane with a 48-foot boom and a Haiss 5/8-yard clamshell bucket loads an Erie AggreMeter of 104-ton capacity.

first the load of cement, and then the water from a tank erected on one edge of the same platform.

This tank was of 100-gallon capacity and could be regulated to release the required number of gallons into the batch as determined by the moisture

content of the aggregate at any given time. The tank was supplied from two 750-gallon tanks erected on top of an adjoining platform at a slightly higher elevation so that the flow from the two larger tanks to the smaller one was by gravity. The big tanks were filled with water from an artesian well drilled alongside the platform, through a 2-inch connecting pipe. No pumps were required to lift the water, the natural flow sufficing.

Three men were required at this point: two emptied the bags of cement into the hopper, after which the gate was tripped discharging all the cement at once into the truck-mixer; a third man admitted the water. Then the trucks backed under the aggregate bin to collect the sand and stone. A typical 10-bag batch by dry weights consisted of:

Cement	940 lbs.
Sand	2,191 lbs.
Stone (granite)	4,534 lbs.

To this was added 65 gallons of water, theoretically. But moisture in the ag-



C. & E. M. Photo

Screeding and finishing on the 3-foot concrete widening strips along U. S. 17 are done by hand with bullfloat and "charley horse" screed.

gregate generally accounted for 15 gallons so that an average of only 50 gallons was usually added. The gradation of the sand and stone according to the specifications required and a typi-

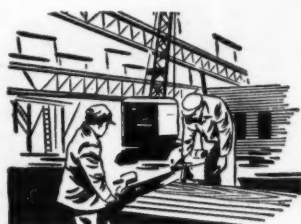
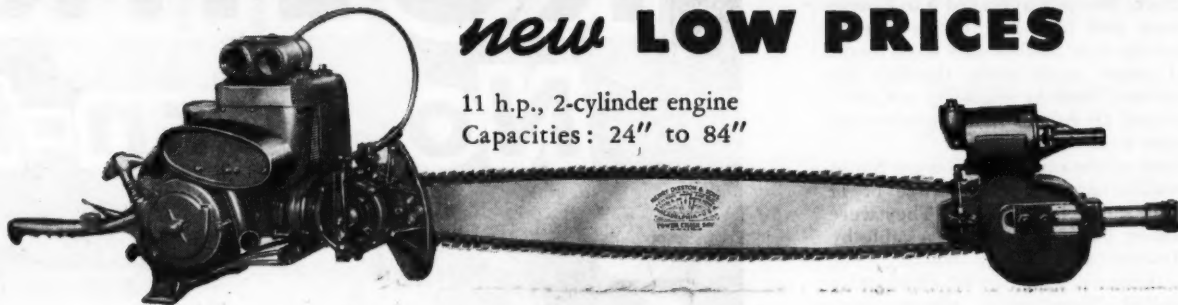
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DISSTON CHAIN SAW

with Mercury Gasoline Engine

new LOW PRICES

11 h.p., 2-cylinder engine
Capacities: 24" to 84"



The Disston Chain Saw is the fastest, timber-cutting, portable saw ever made. It is ruggedly built, light in weight, easy to operate, and cuts from all angles. And its numerous exclusive features combine to make it the most dependable, economical and durable chain saw ever made.

Among these features are an 11 h.p., 2-cylinder engine; a positive-acting, non-slip, multiple-disc clutch; a detachable air cleaner which keeps dust from carburetor; die-cast engine cylinders and cooling fan; gear

driven magneto; fuel filter built in tank; a tough, cutting chain of Disston Steel which maintains perfect contact with drive sprocket under all load conditions.

The Disston Chain Saw is a product of Disston saw-making skill and dependability. It's a typical example of the economy of Disston quality. Thousands are now in use on operations of many kinds—in the forests; on railroad contracting, and tree service jobs; at shipyards and manufacturing plants—wherever there are heavy timbers to cut.

DISSTON CHAIN SAW

PNEUMATIC



HUNDREDS OF APPLICATIONS

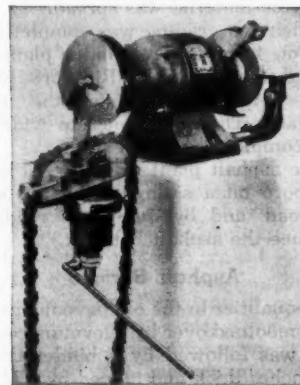
A powerful, light weight, air-driven saw that is speeding up timber cutting and reducing costs for general contractors, railroads, shipyards, and many other users. It requires no previous experience to operate, and can be used in all climates and weathers... even under water.

Gear housing and saw mechanism may be rotated in either direction for vertical or horizontal cutting. Equipped with heavy-duty, vane-type motor specially engineered and produced by Chicago Pneumatic Tool Company for use on Disston Chain Saws. Requires little maintenance as it is built for long, economical service.

3 1/2 and 5 h.p. motors in 24" and 36" sizes. The 3 1/2 h.p. motor requires 90 cu. ft. of air per minute, the 5 h.p. motor, 150 cu. ft., each at 90 lbs. pressure per sq. in.



Write for full particulars, or see your Disston Distributor, who carries complete stocks of parts and is prepared to render prompt and expert service.

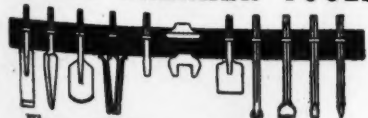


DISSTON ELECTRIC CHAIN SAW SHARPENER

Enables you to do your own sharpening... quickly, easily, accurately. Keeps chains in first class condition.

"BICKNELL BETTER BUILT"

PAVING BREAKER TOOLS



We manufacture a complete line of tools for pneumatic paving breakers, rock drills and diggers.

Write for descriptive circular

BICKNELL MANUFACTURING CO.
12 LIME STREET ROCKLAND, MAINE

HENRY DISSTON & SONS, INC., 974 Tacony, Philadelphia 35, Pa., U.S.A.

Busy Road Widened, Given New Surfacing

(Continued from preceding page)

cal batch was as follows:

Sieve Size	Per Cent Passing			
	Sand		Stone	
	Spex	Typical	Spex	Typical
2-inch	....	....	100	100
1½-inch	....	....	90-100	100
¾-inch	....	....	30-70	51
¾-inch	....	....	15-40	19
No. 3	100	100	....	....
No. 4	95-100	99	0-6	4
No. 8	....	....	0-2	1
No. 16	60-95	88	....	....
No. 50	5-30	16	....	....
No. 100	0-8	1	....	....

Grading the Shoulders

As the widening on Section 5 progressed to a conclusion in March, the 3-foot shoulders were built up with material taken from various borrow pits along this stretch. Cuts 2 to 3 feet deep were made by a Northwest 18 crane equipped with a ½-yard drag bucket which loaded to a fleet of six dump trucks. The average haul was a mile and the shoulder material was spread and shaped by the Adams motor grader.

On Section 4 where the wider 10-foot shoulders were built, the P & W Construction Co., used six Tournapulls for hauling material from eight different borrow pits located at various points off the right-of-way along the 10-mile contract. The pits averaged 5 to 8 acres in area and first had to be cleared before the 5 to 10-foot cuts were made. Haul roads were made through the woods and kept in shape by a Caterpillar and an Adams motor grader; the average haul was 1½ miles.

Three of the dirt-movers were Super C models carrying an average of 11 yards of sand-clay material. They were loaded by being pulled with a cable by an International TD-18 tractor. The other three were the new C6 electrically controlled Tournapulls which were push-loaded by a Caterpillar D8 tractor. The scrapers attached to these units hauled 14 to 15 yards per load and rolled on Firestone heavy-duty tires: 21.00-25 on the front, and 21.00-24 on the rear.

The six Tournapulls spread about 4,000 yards of material in a 9-hour day despite their speed being held to about 18 mph because of the heavy traffic that was using the road throughout all the grading operations. To do this, each unit had to make from 40 to 50 round trips per day from the borrow pit to the road. A D8 tractor-dozzer and the two motor graders shaped the shoulders after the material was spread.

When the grading was completed on Section 4, the concrete batch plant was moved northward to Riceboro which was centrally located for the upper contract. Then the concrete widening was completed on both sides.

The asphalt plant was also set up in Riceboro on a siding of the Seaboard Railroad, and by June was ready to produce the asphalt hot-mix.

Asphalt Surface

Inequalities in the old pavement were first smoothed over by a leveling course. This was followed by a binder course 1½ inches thick and topped by a Modified Topeka surfacing 1 inch thick. This black-top pavement extends ¼ inch above the new concrete header at the sides of the widening. The material is laid in two 12-foot lanes by a Barber-Greene Finisher and rolled by two tandem 10-ton rollers, an Austin-Western and a Galion. An average of 35 trucks haul the material. The new 24-foot pavement is expected to be completed in November.

The plant is strung out on three railroad cars. The first car, 50 feet long, contains an 8,000-gallon asphalt tank, a 500-gallon fuel-oil tank, and a steam pump for pumping the asphalt from the tank to the pugmill through a 4-



C. & E. M. Photo

A Smith 4-yard truck-mixer on a Ford truck chutes concrete into the form for the widening strip on U. S. 17 in Georgia. As the five truck-mixers employed on this job moved along one side of the road, traffic was maintained on the other side.

inch jacketed line. On the 40-foot-long middle car is mounted the pugmill. Above it are the hopper and screens which are fed by a 40-foot hot elevator.

This car also contains a Cleaver-Brooks oil-burning boiler, which is used as a spare on this job, and a Cummins K1 6-cylinder 675-rpm diesel engine which

drives the pugmill and the hot elevator. The 72-foot third car supports twin 35 x 4-foot driers turned by an International TD-18 engine. A TD-14 engine drives the exhaust fan which removes the dust and fumes from the driers and discharges them out a smokestack. At the middle of the car, adjacent to the driers, is the intake hopper for the aggregate which is handled by a crane.

Asphalt is delivered to the siding in tankcars and transferred to a 10,000-gallon horizontal storage tank by a Warren Bros. asphalt pump driven by a Ford Model A engine. A Worthington steam pump moves the asphalt from this storage tank to the tank on the first car. Another Worthington pump forces fuel oil from a 10,000-gallon horizontal tank to the two burners on each drier. Another 10,000-gallon vertical tank holds boiler water obtained from an artesian well. The Erie City Iron Works locomotive-type boiler is fired by fuel oil. To pick up their loads at this plant, trucks can drive

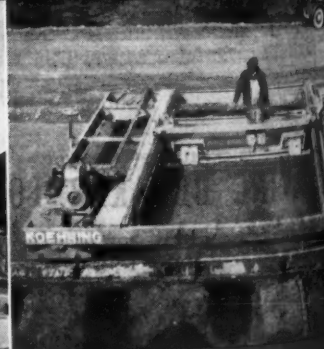
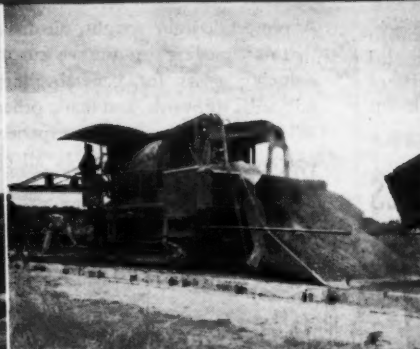
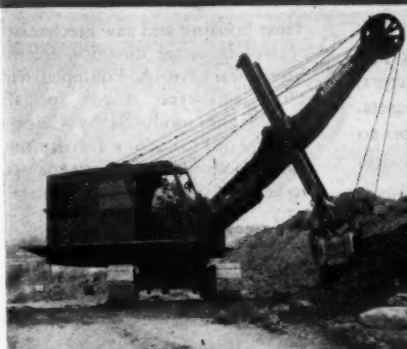
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KOEHRING

No turn-time...



Other Koehring Heavy-Duty units to help you



Koehring excavators range in size from ½ yard up. Each built to exacting Heavy-Duty standards. See the Koehring 605 (1½ yard), Koehring 364 (1¼ yard), Koehring 265 (1¼ yard).

Koehring Pavers have poured more concrete highways than any other. Get Bulletin on Koehring 34-E Twinbatch, the 1947 model of a famous line. Ask about Koehring Integral Finisher, a Koehring exclusive.

Speed Construction Plan On Missouri Flood Control

Plans to speed up construction work on the Missouri River flood-control and development program were announced by Brig. Gen. Lewis A. Pick, Missouri River Division Engineer, after meeting with his district engineers. It is the General's plan to obligate all funds authorized by the Congress prior to July 1, 1948. This will mean advertising for a large number of new contracts between now and the end of the year.

The bill passed by the Congress and signed by President Truman provides approximately \$60,000,000 for flood-control projects of the authorized Pick-Sloan plan. It also provides an additional \$6,750,000 of Rivers and Harbors funds for new work and \$6,990,000 for maintenance on the 9-foot Missouri River navigation channel up to Sioux City, Iowa. It is intended to take advantage of the remaining summer and autumn months to get as much work as possible started this calendar year.



C. & E. M. Photo

The asphalt plant set up by S. J. Alexander, Inc., is strung out on three railroad cars. The first car contains an asphalt tank, fuel-oil tank, and steam pump; on the second are mounted the pugmill, hopper, screens, a boiler, and a diesel engine; the third supports twin driers. As shown here, the plant has not yet started to operate.

General Pick said that all possible speed, consistent with efficiency and sound engineering practice, would be exercised in getting additional contracts under way at such large projects as the Garrison Dam in North Dakota; the Fort Randall Dam in South Dakota;

Harlan County Dam on the Republican River in Nebraska; Cherry Creek Dam near Denver; Kanopolis Dam on the Smoky Hill River in Kansas; and other important projects such as the flood-control works at the Kansas cities, Omaha, and Council Bluffs.

Busy Road Widened, Given New Surfacing

(Continued from preceding page)

under a 12-foot conveyor belt on which the material is discharged from the pugmill.

Quantities and Personnel

The major items included in the two contracts totaling \$914,000 are:

Item	Section 4	Section 5
Excavation (borrow)	192,943 cu. yds.	"
Concrete widening	33,026 sq. yds.	46,815 sq. yds.
Bituminous leveling course	3,989 tons	5,755 tons
Bituminous binder course	10,235 tons	13,564 tons
Modified Topeka surface	6,824 tons	9,043 tons
*Grading during first-stage construction on Section 5 was on a linear-mile basis.		

P. M. Fraser is Superintendent for S. J. Alexander, Inc., the prime contractor, and Clarence Voyles is Superintendent for the Pickering & Wilkerson Construction Co., which did the grading on the north end.

For the Georgia State Highway Department, J. H. Eve, Jr., is Resident Engineer, assisted by Inspectors L. R. Adams and William W. Howington. The project is located in the Savannah Division of which J. O. Bacon is Division Engineer. John Beasley is Director of the State Highway Department while Warren R. Neel is Deputy Director and Chief Engineer.

Truck Power Take-Off

Production of a heavy-duty power take-off for Dodge Power Wagon trucks is announced by the Truck Equipment Division, Davey Compressor Co., Kent, Ohio. The unit was developed by Davey in conjunction with the Dodge Engineering Division.

Davey says that the Power Wagon take-off is easily installed in the truck's drive shaft, with nothing to fit or adjust. Truck-mounted equipment can then be driven directly from the Dodge engine through the take-off, with no need for separate auxiliary engines.

The Davey unit uses an internal and external gear drive as its basic principle. According to the manufacturer, this operates as a strong and durable spline. There are no rotating or meshing gears connected to the transmission.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 92.

Dredging-Equipment Data

A catalog which describes its complete line of hydraulic dredges and related equipment is available from the Morris Machine Works, Baldwinville, N. Y. Bulletin No. 177 has a stiff-paper cover and is punched for insertion in a 2-hole looseleaf folder.

This 24-page bulletin describes the advantages claimed for the Morris hydraulic dredges and shows photographs of them at work on some typical jobs. It includes dredges with plain suction intake or with revolving cutter; with power provided by electric, diesel, or steam units; with pontoon, seagoing, or portable hulls. The bulletin also describes the various pumps in the Morris line, special fittings, and other dredging accessories.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 55.

Midwestern Asphalt Plant

The completion of a plant at Hartford, Ill., for processing and blending Trinidad asphalt has been announced by The Highway Co., Zionsville, Ind. The new plant will serve the states of Iowa, Missouri, Illinois, Indiana, Kentucky, Michigan, Wisconsin, and Tennessee.

DUMPTOR

More Haul-time

Dumpton never turns on shuttle hauls, runs backward as fast as forward

Are slow turns at the shovel, at the dumping point robbing you of important hauling time that could increase your profits? Time your present shuttle haul operation. Find out just how much turning costs you. Then, check Dumpton savings.

Here's How Dumpton Works On Shuttle Hauls: Reverse speeds, three of them, are just as fast as the three forward speeds. On shuttle hauls, you never turn the Dumpton, either at the shovel or at the dumping point. You come in to the shovel, engine first. Loaded, you travel body first; at the dumping point, you're in the right position for instantaneous dumping, without a single turn.

Transmission Built for Shuttle Work: Dumptons, and only Dumptons, can shuttle without asking for transmission trouble. Unlike the conventional truck transmission, the Dumpton transmission is especially designed for this type of work. Gears that produce reverse travel are just as large as the "forward" gears. That's why there's no undue stress, no need for excessive lubrication, no transmission trouble.

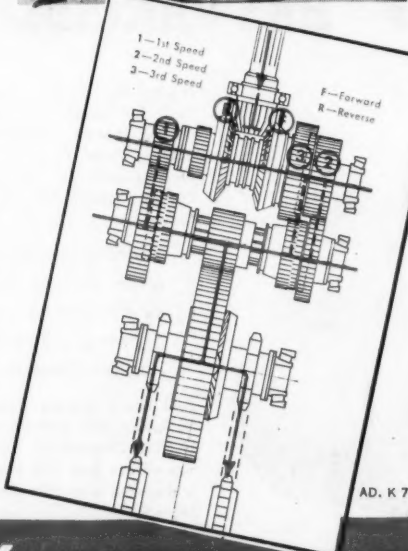
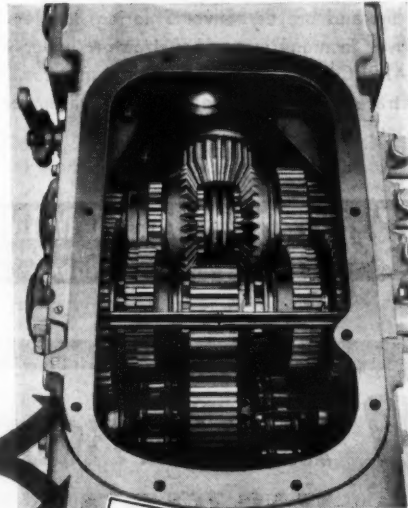
High speed travel without turn delays is only one reason why fewer hauling units will do the job if you're using Dumptons. Here are three other reasons:

Instant Dumping — No Body Hoist: Saves 10 to 20 seconds every time it dumps. No waiting for slow-raising body hoist. Dumps fast even in zero weather. Kick-out pan leaves body clean.

Drive Axle Built For Rock Hauling: Four-inch chrome steel drive axles are heat-treated. Heavy steel case protects entire assembly. Steel dump body has 4" channel reinforcements. Steering axle oscillates to absorb frame-twisting shocks of rough haul roads.

Easy to Maintain: Everything accessible. One man can grease Dumpton in 5 minutes. Clutch pulls out in a fraction of usual time because motor is not moved, transmission case is not touched. Every transmission gear is removable through one cover. No body hoist maintenance, because Dumpton has no body hoist.

Experienced Dumpton engineers are ready to survey your shuttle haul problem. Contact your Koehring distributor today.

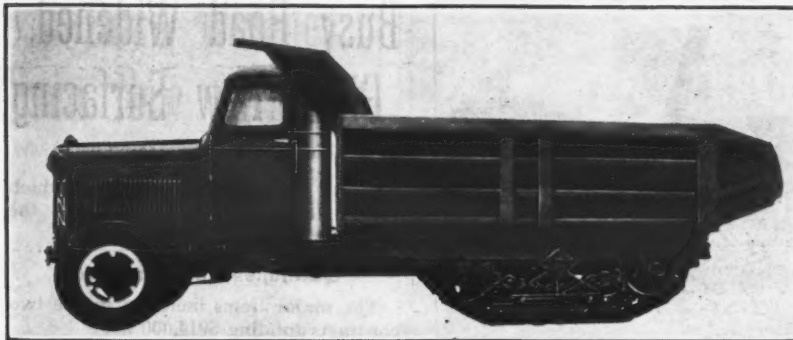


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KOEHRING COMPANY MILWAUKEE 10, WIS.

Subsidiaries: K W I K - M I X • J O H N S O N • P A R S O N S





The new Model D-15 Linn Hafrak features a new long traction unit for full contour traction and increased stability.

Half-Track Trucks

A new model half-track truck chassis has been announced by The Linn Mfg. Corp., 250 W. 57th St., New York 19, N. Y. Basic design improvements claimed for the Model D-15 are full contour traction over a maximum engaged-track area and increased stability, a new long traction unit for greater load capacity and track area, higher speeds, and either gasoline or diesel-powered units.

The Linn Hafrak chassis can be fitted with body styles to suit the operation for which it will be used: dump truck, shovel, crane, or dragline, etc. Capacities range from 5 to 50 tons. Because of the half-track feature, the Linn chassis are said by the manufacturer to provide all-weather operation over all types of terrain and ground conditions.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 93.

Marginal-Soil Stabilizer

A method for making available vast quantities of marginal stabilizing materials has been developed by the New Mexico State Highway Department. By "marginal" is meant the state's large deposits of caliche, sandy gravel, and gravel which contains too much clay to meet highway specifications without the addition of sand.

Experiments conducted at the Highway Department Testing Laboratories at the University of New Mexico in Albuquerque showed that the addition of small amounts of cement would sufficiently overcome the plasticity characteristics of the clay. The object was not a soil-cement, involving percentages of cement ranging from 6 to 12,

but only enough cement to counteract the clay and make the marginal soils available for use.

Experiments showed that the addition of 2 per cent by dry weight would give the results desired. Samples were made up in this proportion and placed under water. At the end of a two-year period, the laboratory reports, the samples were still firm, volume change was negligible, and absorption well below allowable limits.

Bearings Lubricant

A lubricant specifically designed to protect ball and roller bearings is made by the Swan-Finch Oil Corp., 201 No. Wells St., Chicago 6, Ill. It is claimed that Motul No. 424 lubricant shows little change in consistency at operating temperatures, and remains plastic at elevated temperatures.

Other features claimed for this lubricant are that it possesses high resistance to oxidation, separation, and aeration. It is said to maintain an effective seal between the rotating shaft and the bearing housing.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 15.

Canvas Firm Changes Name

A change in its firm name has been announced by the Canvas Products Co. of Chicago. The new firm name, registered under the laws of the State of Illinois, will be Canvas Fabricators, Inc. Operations will continue from 651 W. Fulton St., Chicago 6, Ill.

Not just because it reduces the pull on steering levers to five pounds, or even less, but because it reduces wear on clutches, throwout bearings and brakes. Silver Steering Boosters pay their cost many times over in many ways. Any tractor dealer will install one on trial, ON APPROVAL, in less than thirty minutes. Ask your dealer to demonstrate a Silver Booster and you will never operate a tractor without one.

Silver BOOSTER MANUFACTURING CO.
1406 SOUTH GRAND AVENUE
LOS ANGELES 15, CALIFORNIA Richmond 6191

STRONG, DURABLE, SAFE...for Outdoor or Indoor Service



'AIR KING'

Quick-Acting, Universal Type HOSE COUPLING

With Auxiliary Locking Arrangement

The most adaptable air hose coupling of its kind, combining quick action with superior strength and safety. Made of malleable iron (cadmium plated) or brass. Shanks of hose ends are long, simply corrugated and smoothly finished, permitting easy insertion in the hose and providing a tight grip under clamp pressure. Plain design and construction—no parts to foul up or get out of order.



I.P.T. Male End

I.P.T. Female End

Locking heads are identical for all sizes of hose or threaded pipe ends, making it possible to couple any two sizes of hose, or hose and pipe, of "Air King" dimensions, without adapters, bushings or other extra fittings. Hose ends, 3/8", 1/2", 3/4", 1", and 1 1/2". Pipe ends, 1/4", 3/8", 1/2", 3/4", and 1".

PATENTED LOCKING ARRANGEMENT

A cotter pin, nail or wire inserted through hole in flanges on locking heads, after connection is made, will prevent the coupling from coming apart regardless of handling or vibration.

* * *

OTHER DIXON AIR HOSE COUPLINGS include the "DIX-LOCK," a quick-acting, streamlined coupling with renewable sleeve and spring; "G J-Boss" and "G J-Dixon" ground joint air hammer couplings; "Boss" and "Dixon" washer type air hammer couplings.

Stocked by Manufacturers and Jobbers of Mechanical

Rubber Goods

IF IT'S A **DIXON** PRODUCT

IT'S DEPENDABLE

DIXON
VALVE & COUPLING CO.
Main Office and Factory: PHILADELPHIA, PA.
BRANCHES: CHICAGO, BIRMINGHAM, LOS ANGELES, HOUSTON



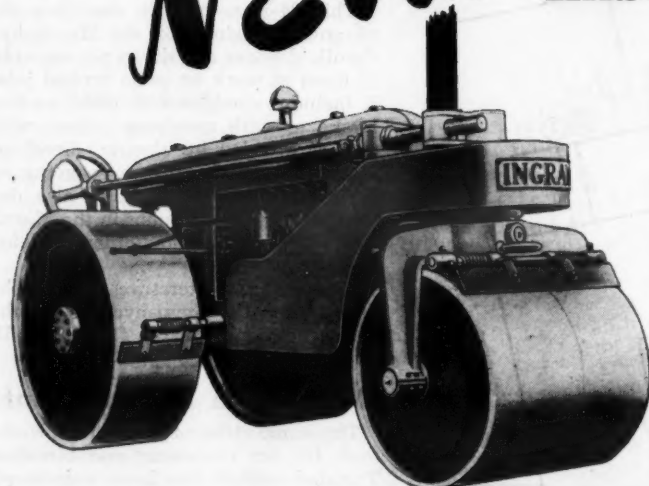
Hotel Strand

Atlantic City's Hotel of Distinction

A hotel planned and designed for your every comfort... assuring you absolute rest and relaxation... amid an atmosphere of refinement... Beautifully furnished rooms... Ocean front verandas... Rooftop solarium... Salt water baths... Cuisine unsurpassed... Garage on premises. Open all year.

Exclusive Pennsylvania Avenue and Boardwalk

NEW! INGRAM MODEL 45 NOW HAS VARIABLE WEIGHT



It's another Ingram improvement—variable weight for a lightweight, high-speed roller. Hollow wheels on the Ingram Model 45 allow weight to be increased from four to five tons. But that's only ONE reason for the tremendous popularity of Ingram Model 45. Check these other features, too—

- ☐ 87-in. Wheelbase for Operating Ease
- ☐ 65-in. Rolling Width—2 1/2-in. Overlap
- ☐ 32-HP International Gasoline Engine
- ☐ 5 Forward Speeds—2 to 12 MPH
- ☐ Positive Control Manual Steering

And every Ingram Roller — 4 to 12 tons — is equipped with self starter and sprinklers—AT NO EXTRA CHARGE. See your Ingram distributor now—learn how the Ingram saves on maintenance costs—and why operators prefer the easy handling Ingram.

ACME WIRE AND IRON WORKS
SAN ANTONIO 6, TEXAS

INGRAM ROLLERS

Landscape Experts Design Roadsides

Safety and Simplicity Are Features Planned by Five Landscape Advisors on Staff Of Texas Highway Dept.

† FIVE full-time landscape advisors, each an expert in charge of roadside planning for about 50 counties, are on the staff of the Texas Highway Department. Entrusted with the job of designing roadsides to the highest standards of service and safety, these men work in cooperation with the district engineers in their area.

Objectives and Organization

The roadside-development program of the Texas Highway Department has always been aimed at the elimination of driving hazards, garish structures, high bridge railings, and objectionable signs. It has never been aimed at beauty for beauty's sake alone. Under the direction of Jac L. Gubbels, Head Landscape Architect, it has come a long way towards realizing its objectives.

Each advisor, working under Mr. Gubbels' direction, covers about five districts, and maintains an office in the district in the center of his territory. It is his function to plan his work for the general well-being of the highway. Thus when he suggests grass planting, it is for the purpose of erosion or dust control. When he calls for low shrubs, they may be for the purpose of outlining a curve in the road to serve as a warning.

Under this system, landscape men are in a unique position. They have to sell their ideas, through the district engineers, to Mr. Gubbels. The district engineers, too, frequently make favorable recommendations for roadside-development work to the landscape men.

Roadside development is a part of construction and maintenance. And except for isolated and special cases, all costs are defrayed from the regular construction or maintenance budgets. If a district engineer or landscape advisor wants to put in a roadside park, and has no budget allowance left, he must first convince Mr. Gubbels it is feasible and necessary before Gubbels will go before State Highway Engineer D. C. Greer and the Commission to ask for funds.

Roadside Parks

Incidentally, roadside parks are not built just for the sake of having a turnout. They are placed at regular intervals so that a driver suffering fatigue can have a restful place to pull off the road and recuperate for a few minutes. Texas roadside parks are numerous and beautiful, but simple. Wherever possible they have a source of drinking water.

The Highway Department is, of course, interested in maintaining clear sight distances, and keeping down the number of distracting advertising signs which can cause accidents. A Roadside Council has been of help in this.

Sign Removal

It is composed of nine prominent citizens who serve the state without salary. Three of the members serve for a term of two years, three for four years, and three for six years. These citizens are all influential. By working with the large brewing companies, for instance, this council succeeded in having 1,300,000 unsightly advertising signs removed from the country adjacent to Texas highway right-of-way. They persuaded another large soft-drink concern to remove even more signs.


Along the outskirts of cities and towns this council has succeeded in banding the citizens together so closely that new buildings have to meet certain standards, usually set by the citizens themselves. This has made for a high standard of civic pride; it has also helped the value of property.

All a part of roadside development, or landscaping, the work of the "grass planters" has been placed on a full-time par with new construction, design, and maintenance as a part of the highway system.

The Texas Highway Department is headed by D. C. Greer, State Highway Engineer, with Jac L. Gubbels as Head Landscape Architect.

Morris Named Sales Mgr.

R. E. Morris has been named Sales Manager of the Pickup Dump Division of the National Truck Equipment Co., Waukesha, Wis. Mr. Morris previously held a similar position with The Baughman Mfg. Co. of Jerseyville, Ill.



HERE'S A CRACK 100 YEARS OLD!

My wife and I made a fair exchange. I married her for her money and she married me for my mind. Now she's lost her money and I've lost my mind!

HERE'S A CRACK 6 YEARS OLD REPAIRED WITH

MANGANAL

(TRADE MARK REG. U.S. PAT. OFF.)

11% to 13½% MANGANESE NICKEL STEEL

And the equipment is good as new! Better even. Because impact and abrasion makes MANGANAL tougher, the more you abuse it. Use MANGANAL APPLICATOR (Filler) BARS for re-surfacing broken and worn down 11% to 14% Manganese and Carbon Steel parts. Special Shape MANGANAL APPLICATOR BARS for worn tractor grousers, clam shell and bucket lips. MANGANAL HOT ROLLED PLATES for patching power shovel buckets, drag lines, etc.

FREE FOR THE ASKING! Our Booklet, "The Welding of 11% to 14% Manganese Steel"

STULZ-SICKLES CO.

Sole Producers

91 N. J. Railroad Avenue,

NEWARK 5, N. J.

SPOT IT WHERE YOU WANT IT

with the MultiFoote Elevating Boom!

Think over what a setup like this saves you. Here you have the new MultiFoote Duo-Mix 34-E with the MultiFoote Elevating Boom feeding a Pumpcrete.

Here is a high capacity, smooth operation that puts the concrete where you want it without the complications of Shooting Towers, Cranes or other devices.

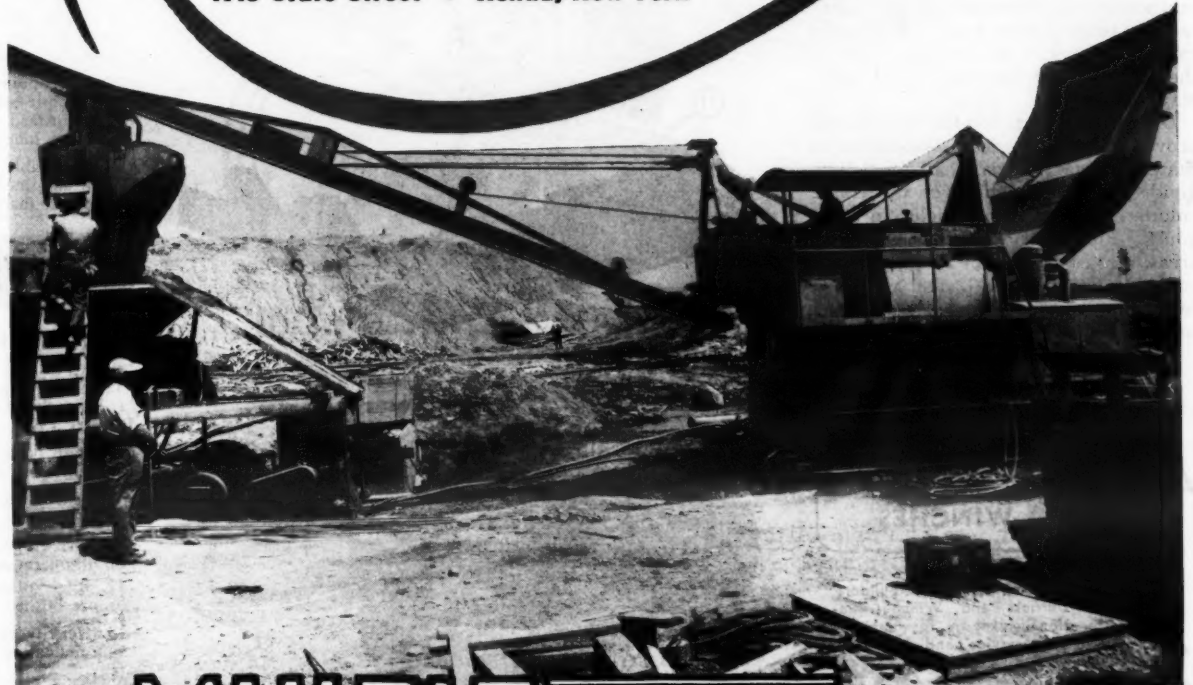
The MultiFoote Elevating Boom dumps right to the Pumpcrete Hopper or it will discharge to forms for abutment reinforced concrete walls or footings to heights up to 8½ Ft. No crane is necessary. Bucket travel is rapid and it can be adjusted to travel and hang in a level position regardless of the boom angle.

The MultiFoote Elevating Boom means less investment for equipment, less handling of materials, faster pouring and greater profit. It is available for both single and double drum MultiFoote Pavers and can be installed on models in the field.

THE FOOTE COMPANY, INC.

1916 State Street • Nunda, New York

Also see page 74



MULTIFOOTE
CONCRETE PAVERS

Builders of ADNUM BLACKTOP PAVERS, MULTIFOOTE CONCRETE PAVERS, AND FOOTE KINETIC MIXERS





A Caterpillar No. 12 diesel motor grader, equipped with a Caterpillar V-type snow plow and snow wing, clears highways in Kittson County, Minn., at an estimated hourly fuel cost of 21 cents. The unit patrols 150 miles; in warmer weather it is used for general road maintenance.

Interstate Highway System Is Approved

A national system of highways has been approved by the Public Roads Administration. (See map on page 4.) Routes were selected on the basis of recommendations by state highway departments.

The new interstate system shows a total of 37,681 miles of the nation's principal highways. It comprises the most heavily traveled highways in the present Federal-Aid system, and includes extensions of the system through urban areas.

It reaches 42 state capitals, and will serve directly 182 of the nation's 199 cities with a population of 50,000 or more. Average traffic on its routes, exclusive of urban sections, was 2,693 vehicles per day in 1941 as compared with 1,439 on the Federal-Aid system, 972 on state highways, and 155 on all rural roads.

Control of access on the system is considered essential, especially in and near cities. Access points are to be placed as frequently as they are needed, but not so close as to hamper the rapid movement of traffic. Many states do not yet have adequate legal authority to control access.

In many large cities depressed or elevated expressways will be built, making city travel possible at an average speed of 35 to 45 mph, without stops for traffic signals and free of interference by cross traffic. Depressed portions of expressways will be supplemented by parallel-frontage roads for local traffic, and bridges will be constructed at inter-sections to serve cross traffic. The urban expressways will be integral parts of the national interstate system of highways.

Design standards for the system approved by the American Association of State Highway Officials call for 4-lane divided highways wherever the traffic volume is 800 motor vehicles in peak hours. For such highways in rural areas, a right-of-way of 250 feet is advocated. Traffic lanes 12 feet wide are recommended on all heavily traveled routes. Where traffic density exceeds

3,000 vehicles in peak hours, elimination of all cross traffic at grade is advocated.

Authority for the new system is contained in the Federal-Aid Highway Act of 1944 which requires that "there shall be designated in the continental United

States a national system of interstate highways not exceeding 40,000 miles in extent, so located as to connect by routes as direct as practicable the principal metropolitan areas, cities, and industrial centers, to serve the national defense and to connect at suitable border points with routes of continental importance in the Dominion of Canada and the Republic of Mexico". The Act also requires that these routes be selected by joint action of the highway departments of each state and the adjoining states, and approved by the Federal Works Administrator.

The Federal-Aid Highway Act of 1944 authorized \$500,000,000 in each of the three fiscal years following the war to assist the states in developing a \$3,000,000,000 highway program. This would include improvements on the regular Federal-Aid system, on highways in urban areas where the population is 5,000 or more, and on a Federal-Aid system of secondary roads in each state.

The sum of \$225,000,000 was set aside

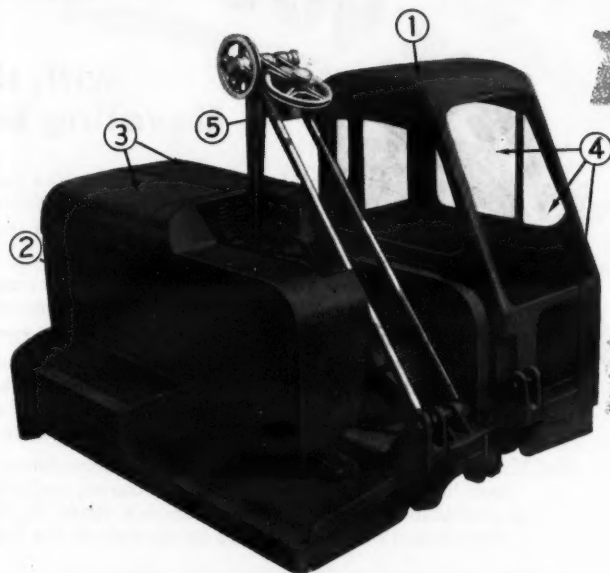
from the authorized annual appropriation for improvements on highways in the regular Federal-Aid system; \$125,000,000 was made available for urban sections of the system only, including expressway, circumferential, and distribution routes; and \$150,000,000 was earmarked for state systems of secondary roads.

No specific sum was provided for the national interstate system; however, since it is a part of the Federal-Aid system, the amounts provided for this system are available. The appropriations authorized have already been apportioned among the states.

Gardner-Denver Sells Its Governor Division

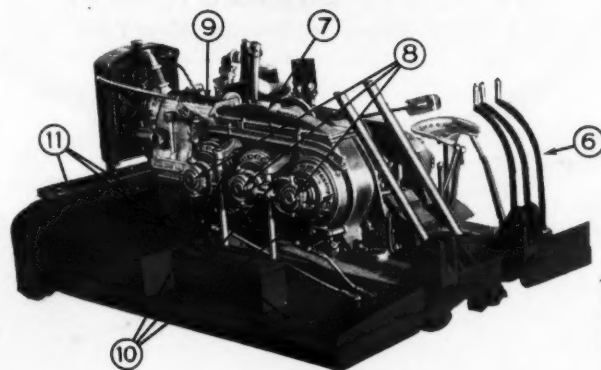
In order to concentrate its facilities on the manufacturing of rock drills, air compressors, pumps, and allied products, the Gardner-Denver Co. has announced the sale of its governor business. Purchaser was the Wiebner Machine Shop of Quincy, Ill.

Look into UNIT!



FULL VISION CAB

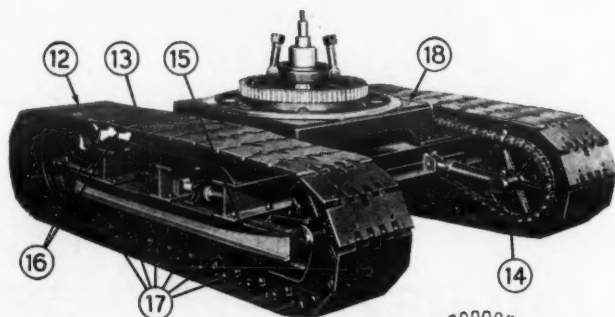
1. Streamlined to the minute in design . . . operator can see in ALL directions . . . clear visibility around a complete 360° circle, without sacrificing weight, capacity, or headroom.
2. Sliding side panels provide accessibility to motor and clutches.
3. Easily lifted top hood covers . . . locked from within the cab.
4. Shatter-proof Safety Glass used throughout the entire cab.
5. A Frame front legs and end connections are one-piece drop forgings.



MAIN MACHINERY

6. Curved operating levers . . . for easy operation and control.
7. One-piece cast gear case completely encloses all gears and shafts in a constant flow of oil . . . Positive protection for all moving parts. Bored for perfect alignment by machine designed specifically for this accurate operation . . . misalignment is impossible.
8. Heat-treated alloy steel gears and shafts are involute splined. No keys to replace . . . no worn-out keyways. Large diameter shafts with short spans between bearings . . . minimizes deflection and bending . . . reduces bearing replacement.
9. Gas or Diesel engines are mounted in straight line with main machinery. Worm driven power take-off . . . silent, efficient, and compact.
10. All operating clutches are disc type . . . interchangeable . . . simple adjustment . . . mounted on high-speed counter-shafts instead of directly to drum shafts . . . smoother operation and longer life.
11. Turntable, Platforms, and Counterweight . . . These three important members are perfectly aligned, forming a single rigid unit that provides extra resistance to shocks and strains.


LOWER STRUCTURE




12. Multiple hinged shoes maintain alignment . . . minimize wear of shoes and tumblers.
13. Single adjusting screw for adjusting tread belt and drive chain enclosed in grease, free from dirt, rust, or outside damage.
14. One-piece end bearings with added outboard bearings maintain perfect and permanent alignment of drive shaft and end roller shaft.
15. Husky trussed frame . . . reinforced by one-piece end castings.
16. Drive Sprocket guides . . . prevent treads from jumping off if operating too loose.
17. Idler rollers are drop forged alloy steel . . . manganese bronze bushed . . . Alemite lubrication.
18. Heavily ribbed and flanged lower frame (carbody) of annealed alloy steel . . . roller track cast integral with body.

Automatic Traction Brakes are another exclusive UNIT feature! A friction type locking device for both crawlers . . . self-engaged by spring action . . . automatically released when power is applied. LOOK INTO UNIT . . . write today for catalogs and information.

1/2 and 3/4 YD. EXCAVATORS * * * 5 and 10 TON CRANES




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UNIT CRANE & SHOVEL CORP.

6309 WEST BURNHAM STREET • MILWAUKEE 14, WISCONSIN, U.S.A.
A 5226-1P - C



Two floodlights atop this 18-foot steel tower provide illumination for night construction work. Current is supplied by a gasoline-powered generator in the all-steel body of a utility trailer.

Utility Tower Provides Light for Night Work

A portable lighting unit for night construction work has been developed by the Arrow Supply Co., Pittsburgh, Pa. Feature of the new unit is an 18-foot tower on which are mounted two 1,500-watt clear light bulbs in reflectors. The lights are pivot-mounted and have adjustable beam and spread.

Basis of the unit is a ½-ton utility trailer made by the American Bantam Car Co., Butler, Pa. Welded to its steel bed is a gasoline-powered generator made by D. W. Onan & Sons, Inc., Minneapolis. The welded-steel tower is fastened to the trailer canopy. When folded for transport, the unit has a road clearance of approximately 9 feet.

The generator, in addition to providing ac power for the lights, has a 12-volt circuit for battery charging. Total weight of the equipment carried by the trailer is 800 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 17.

Meter Shows Crown, Slope

A bulletin describing its automatic Slope-Meter is available from The Slope-Meter Co., Mound, Minn. This instrument, mounted on bulldozers, graders, or scrapers, aids in obtaining accurate grades and slopes. The manufacturer recommends its use on motor graders when spreading stabilized base or black-top.

The bulletin describes the unit, shows it installed on various pieces of equipment, and lists its features.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 74.

Twin Disc Appointments

Several staff changes have been announced by the Twin Disc Clutch Co., Racine, Wis. C. F. Mohrbacher has been named Assistant Sales Manager of the Racine division. A. E. Young has been named District Manager of the west-coast territory. E. H. Bennett will be District Manager of the eastern territory, and will make his headquarters in the company offices at Newark. W. L. Dixon will continue with the Newark office in the capacity of consulting sales engineer. J. B. Jenkins will be District Manager of the Michigan territory, with headquarters in Detroit.

P. G. Tyrrell will be Assistant District Manager in the territory served by the new Los Angeles office; and P. W. Wahler has been named Assistant District Manager in the territory served by the Seattle factory branch.

Wade A. Eskridge as Assistant District Manager in the mid-continent

territory is to take charge of operations in the Tulsa office. H. A. Davis, manager of the mid-continent territory, has shifted his headquarters from Tulsa to Dallas, Texas.

Pa. Snow-Removal Cost Estimated at \$7,000,000

With the days of snow removal not very far away, the Pennsylvania Department of Highways is busy obtaining funds and equipment to avoid being caught short-handed. Initial estimates for providing winter service on its more than 20,000 miles of highways during 1947-48 have been set at between \$6,000,000 and \$7,000,000.

Maintenance engineers are studying the need for additional plows, trucks, mechanical snow removers, and other equipment. One of the top items on the list is snow fence. Because of wartime conditions and subsequent shortages, the Department has been unable to purchase any new fence for over five years.



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High Discharge TRANSPORT TRUCK MIXER

- Fast open top charging
- Full view inspection
- Superior mixing assures quality concrete
- Good delivery
- All steel construction
- All bearings fully protected for low maintenance

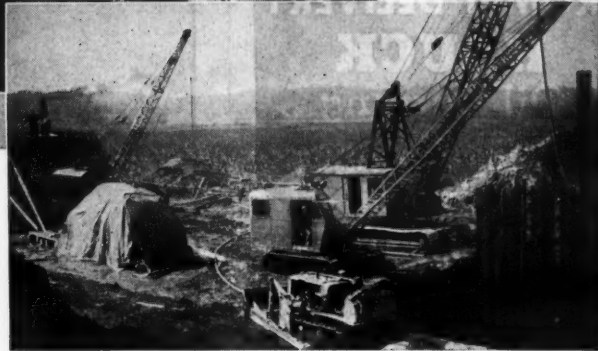
CONCRETE TRANSPORT MIXER CO., Inc.

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"We save time with

Gulf Quality Products
and keep our repair costs low"

says Harry O. Wyse of Lexington, Kentucky



Kentucky Road Oiling Company, Frankfort, Ky., and Harry O. Wyse, Lexington, Ky., have the contract for building the urgently needed Green River Bridge at Aberdeen, Ky. This 1482 ft. span will cost \$497,128.00 and involves the driving of 7½ mi. of steel piling, pouring 6,395.7 cu. yds. of concrete, with steel reinforcement.

"As on previous jobs, we're enjoying top performance from our equipment with Gulf quality lubricants and fuels," says Mr. Wyse. "Gulf products helped us keep going at a fast pace right through the winter months, with no loss of time due to changeable weather conditions and high water."

On all types of construction projects, Gulf quality petroleum products play an important part in keeping the job rolling smoothly. Gulf lubricants provide a higher degree of protection—and Gulf fuels help contractors get an extra margin of performance from their mechanized equipment. Result: speedier, more profitable jobs!

Write, wire, or phone your nearest Gulf office

and arrange to use Gulf quality lubricants and fuels on your next contract. They are quickly available to you through 1200 warehouses located in 30 states from Maine to New Mexico.

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C. & E. M. Photo

Working against the high background of the Davis Dam spillway slope, this driller uses a Chicago Pneumatic diamond drill to bore grout holes.

Grouting of Bedrock Pushed at Davis Dam

Foundation Work Is Stepped Up as The Contractors Strive to Complete High-Pressure Grouting Job in Time For Scheduled River Diversion

✦ USING 4,000 sacks of cement a week, Utah Construction Co. is speeding the high-pressure grouting of bedrock under Davis Dam spillway and intake structures about 67 miles downstream from Boulder City, Nev. Diamond Drillers, Inc., of San Francisco, is doing the high-pressure work under a sub-contract.

Changes caused by troublesome bedrock conditions under the massive \$21,-462,505 dam and appurtenant works, the magnitude of which was unknown when the Bureau of Reclamation contract was awarded, have necessitated design alterations and major revisions in the grouting, resulting in the deletion of certain phases of the program and considerable increases in other phases of the high-pressure undersealing.

While the design of the main 3,800,-000-cubic-yard earth-fill dam has not been affected, changes have been made in the forebay channel and in the power plant, the spillway, and the intake

structure, all of concrete. Unless the grouting is finished before November 15, the diversion of the Colorado River will have to be delayed beyond the tentatively scheduled date. Thus the change has placed Utah Construction Co. in the position of being crowded for time; however, under a change order now being negotiated, ample extension of time for completion of the contract will no doubt be allowed.

Drilling and grouting, continued on a 24-hour basis with augmented equipment, is meeting this situation, however. A dozen Chicago Pneumatic diamond drills chatter by day and night as each rig bores 37 feet of hole per 8-hour day, averaged over a 30-day period by the contractor.

Six Ingersoll-Rand grout pumps are pushing the mix down in the earth at pressures up to 400 pounds per square inch. Tricky fissures and pockets in the foundation bedrock have already produced at least one 200-foot hole which took 2,900 sacks of cement. However, the average is much lower.



C. & E. M. Photo

An Ingersoll-Rand grout-pump set-up sends a cement mix out towards the holes in the background, which are shown in the process of drilling. Note the bag cement on the truck. An average of 4,000 sacks a week is being used for grouting at Davis Dam.

Holes are being put down on a 10 and 20-foot staggered grid pattern. In some cases they have been sunk 20 feet and grouted initially, then drilled and pumped full to a depth of 40 feet be-

fore being grouted a third time as far down as required. Grouting has been done in one case 360 feet below the stripped surface of the bedrock. Holes (Concluded on next page)

PROMPT DELIVERY

HAUCK

Oil Burning
Heating & Melting
Equipment

Get Ready Now!

- Melting Kettles for Tar • Asphalt • Bitumen
- Torch Burners for Heating and Thawing
- Compound Melt. Furnaces
- Lead Melting Furnaces
- Asphalt Surface Heaters
- Asphalt Tool Heaters
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119-129 Tenth St. • Brooklyn 15, N. Y.

The nation is beginning to lay down the greatest highway network yet seen. Your share of this gigantic task will depend very largely on you—and your equipment... You may be sure that Butler modern batching plants and bulk cement plants will enable you to do your part in the program efficiently, quickly, and profitably against tomorrow's toughest competition. Be sure to investigate Butler Engineered Construction Equipment, ready to help you lay many, many miles of the nation's concrete roads.

BUTLER
BIN COMPANY
WAUKESHA, WISCONSIN



Grouting of Bedrock Pushed at Davis Dam

(Continued from preceding page)

200 feet deep are common, according to the superintendent of the work.

The native granitic gneiss, rhyolite, and minor deposits of andesite at Davis Dam were known to be fractured when preliminary explorations were under way, but not until the forebay channel was excavated did the engineers realize the extent and magnitude of two especially severe jointing and fracturing zones underlying some of the important structures. The extensive grouting will fill and stabilize the granite joints; the design change will take care of the two sub-parallel planes of weakness.

Spillway Excavation Finished

Excavation and stockpiling of 3,000,000 cubic yards of earth and rock for the spillway and forebay channel have just been finished, and until high-pressure grouting is completed, work on river diversion and the dam proper cannot begin.

Construction work is being pushed in the field under the direction of Project Manager H. E. Williams, with T. L. Terry, General Superintendent for the Utah Construction Co.

Davis Dam, to generate power and give closer regulation to Colorado River flow in the downstream reaches, was designed under the general supervision of Walker R. Young, Chief Engineer, U. S. Bureau of Reclamation, and is being built under the general direction of E. A. Moritz, Regional Director. H. F. Bahmeier is the Construction Engineer on the project.

Engine Leaks Located

A device for detecting leaks in the cooling system of liquid-cooled internal-combustion engines is announced by James Industries, Inc., 268 Municipal Bldg., Skaneateles, N. Y. Known as Tels, it operates by duplicating normal engine operating pressures.

By applying the proper test pressure, as shown on a chart supplied with the unit, maintenance men can spot the leak quickly, the manufacturer says. Tels is also said to be useful for testing and blowing out fuel lines, needle valves, and other purposes for which low pressure is required.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 7.

Nelson Appoints Manager

The appointment of a manager of its Portable Products Division has been announced by the Herman Nelson Corp., Moline, Ill., manufacturer of heating and ventilating products. The appointment has gone to Robert C. Koehring who joined the Nelson organization in 1943. Mr. Koehring has been associated with the Koehring Co., manufacturer of heavy-construction equipment, and also was Sales Manager for the South Wind Heater Division of the Stewart-Warner Corp.

AASHO Convention

The 33rd Annual Meeting of the American Association of State Highway Officials will be held September 22 to 26 at the Waldorf-Astoria Hotel in New York City. Preliminary committee meetings will begin on Saturday, September 20.

Addresses of welcome are scheduled to be delivered by Mayor O'Dwyer and Governor Dewey. A full program of business and committee meetings will take up the remainder of the week. September 23 will feature the presentation of the Association's 25-Year Award of Merit, an address by Commissioner Thos. H. MacDonald of the Public Roads Administration, and a panel discussion on urban problems. On September 25, Spencer Miller, Jr., will preside over a panel discussion of highway department public relations.

Special arrangements for ladies' entertainment are being made. Official tours for this meeting include Long Island, Westchester, and Connecticut.

A Roller For Every Job

Sturdy, heavy-duty rollers, engineered to stand up under the toughest conditions. Pierce-Bear Tandem Rollers are powered by economical Allis-Chalmers 4-cylinder industrial type gasoline engines. Variable weights, from 3½ to 5 tons with built-in water tanks for ballast and wet rolling.



Pierce Baby Bear
2½-3 tons



Pierce Medium Bear
3½-5 tons

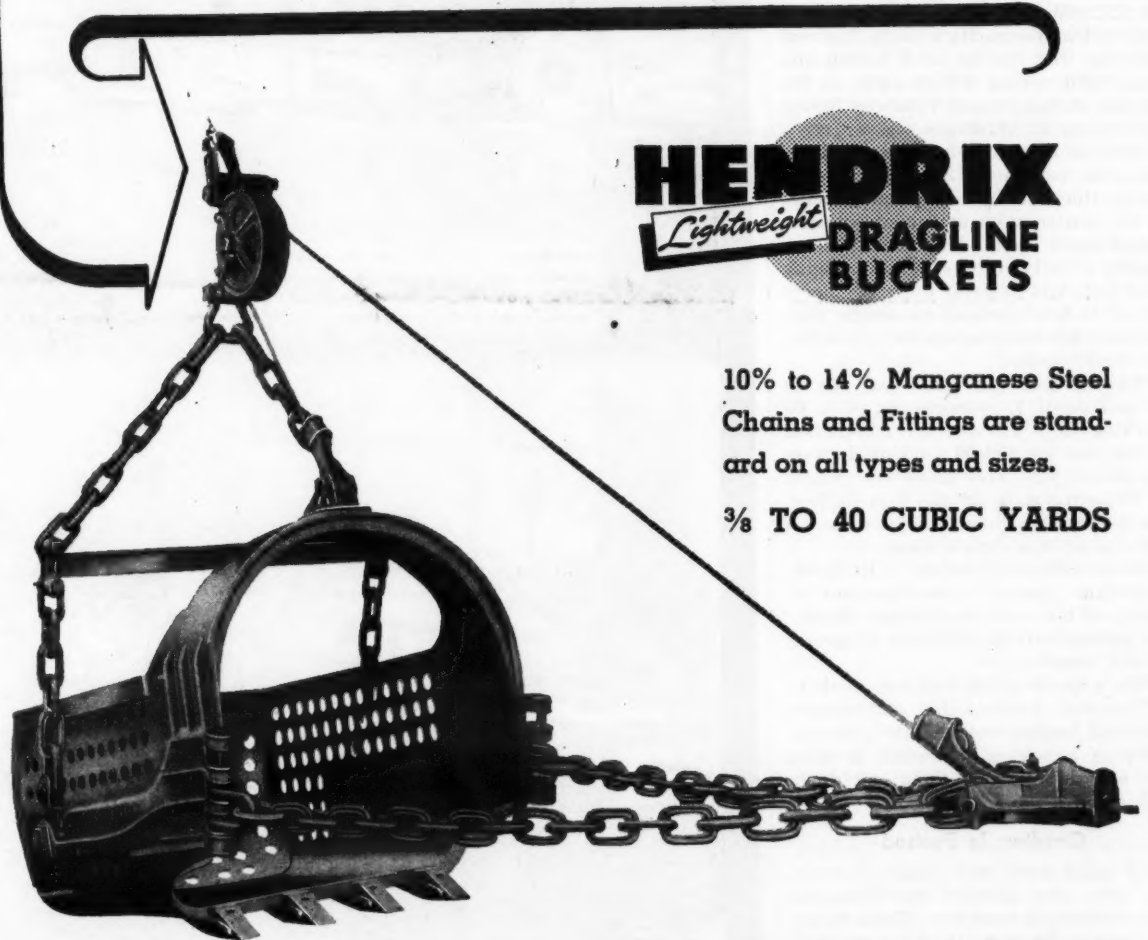
The new 2½-3-ton Pierce Baby Bear is designed for close-in work and small area maintenance. It works against a curb up to 25 inches high and within 1½ inches of a higher wall or building. Final drive is within the rear roll. Use Pierce-Bear Tandem Rollers for all-around performance. Write for folder.

Pierce-Bear Rollers

Lewis Manufacturing Company

415 Hoelgen Avenue—San Antonio 6, Texas

EVERYTHING THAT COULD BE ASKED FOR IN A ⅜ TO 40 CUBIC YARD BUCKET



HENDRIX
Lightweight DRAGLINE
BUCKETS

10% to 14% Manganese Steel
Chains and Fittings are standard on all types and sizes.

⅜ TO 40 CUBIC YARDS

3 TYPES DESIGNED FOR EVERY DIGGING CONDITION

LS..... A lighter weight bucket designed for levee and drainage work.

TS..... A medium weight bucket, classified as a general purpose bucket.

HS..... A heavy duty bucket for moving shale or any hard formation.

- ★ 20% to 40% lighter than other buckets, type for type.
- ★ All welded construction for greater strength and durability.
- ★ Manganese Steel Chains, Fittings, and Reversible Tooth Points.
- ★ Full Pay Load every trip, even in wet digging.
- ★ Perfect Balance; handles easier, fills faster, dumps cleaner.

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MANSFIELD INCORPORATED LOUISIANA

Concrete Paving Held Up by Rains

**Weather-Working Days
Total 21 in Four Months
For 9 Miles of Pavement
Set on Sand Blanket**

† RELOCATION of U. S. 69 from Muskogee, Okla., north towards Wagoner will shorten the old 17-mile concrete pavement between the two cities by 5½ miles. But heavy spring rains slowed concrete paving considerably. Ottinger Brothers of Oklahoma City, which has had the 9.4 miles of new 24-foot 9-7-9-inch concrete pavement under way for the Oklahoma State Highway Commission, spent four months getting 21 workable paving days.

Rain, as a matter of fact, is one of the big reasons for relocating the old highway. There have been many times in the past, during heavy spring rains, when Muskogee was marooned for days from the rest of the state. Automobiles stranded in Muskogee stayed there.

Ottinger's two paving and grading contracts, one for \$218,000 and the other for \$222,000, will furnish this important eastern Oklahoma city with its first real highway that can be used during any predictable period of high water on the Neosho, Arkansas, and Verdigris Rivers converging at Muskogee.

Both contracts call for Class A plain-concrete pavement 24 feet wide, 9 inches thick at the edges and 7 inches in the center, with pavement set on a 3-inch-thick sand blanket. With a variety of soils in the subgrade ranging from red clays to sandy loam, engineers expect to hold the new pavement with considerably less crack pattern by using the sand blanket.

The two jobs got under way March 10 and April 1, respectively, with 60 working days allowed for completion on the first leg and 90 working days on the second job. Five miles were paved in 21 paving days on the first project, but the rain has closed the job down all but one or two days a week.

General Superintendent J. R. Keith, long-time general superintendent in charge of the work for Ottinger Brothers, pointed out the difficulty of paving in wet weather.

"On a grading job you can work in bad weather, cold weather, and to some extent at least in wet weather", he said. "But on a paving job when it rains you can do just one thing: sit down and watch it pour."

Grading Is Pushed

All earth work and grading for the two jobs was handled by Ottinger's own excavating machines. Three Super C Tournapulls were used for most of the hauling. A Caterpillar D8-mounted bulldozer and an International TD-18 machine with a Bucyrus-Erie Bull-grader blade did rough grading and pusher service. Subgrades were sheep-foot-rolled to about 95 per cent of laboratory-test density, and dressed out with a motor grader. Two Caterpillar No. 12 diesel-powered machines were assigned to the job for use on this and other operations.

Sand Blanket Put On

The 3-inch overall trench for the sand blanket under the pavement was bladed ahead by one of the Caterpillar No. 12 graders, working to a line and grade of survey blue-tops set along the form line. The excess dirt was picked up and moved on ahead.

Super C Tournapulls were used to haul sand for the pervious blanket about 4 miles from the Arkansas River

to the job. Tournapulls had the advantage of being self-loading. They made about as good time over the haul roads as dump trucks, and they were able to spread their loads of sand out comparatively thin over the subgrade, leaving very little work for the motor graders to do in finishing off this material.

A Carr Formgrader was then used to dig out the trench for the steel concrete forms.

Form-Work Preparation

Ottinger Brothers sent 2,400 road-feet of Blaw-Knox steel forms out to the job. In general, forms were kept at least 1,000 feet ahead of the paver at all times. With good paving days scarce, Keith wanted to take no chances what-

ever on the variables when the sun decided to come out.

"If we get a decent day," he explained, "I certainly like to be in shape to work 10 to 12 hours if we can."

A 12-man form-setting crew was used. Two men set the 10-foot sections, one man checked them against the string line, two back-stakers drove form pins, and the remainder of the crew were laborers, helping where possible to move the forms ahead. It was not necessary to cover the base of the forms after they were hand-tamped. The forms were oiled by a small spray rig before each pour.

As soon as the forms were set, a No. 12 Caterpillar motor grader dressed the sand blanket to its final shape, assisted by a Koehring subgrade planer drawn

by an International TD-13 tractor. Excess material was dumped out over the side of the forms. The grade was cut exactly, and checked by measuring from a string line stretched over the top of the steel forms. An 8-ton flat-wheel steel roller was used to mash the sand blanket smooth just before paving.

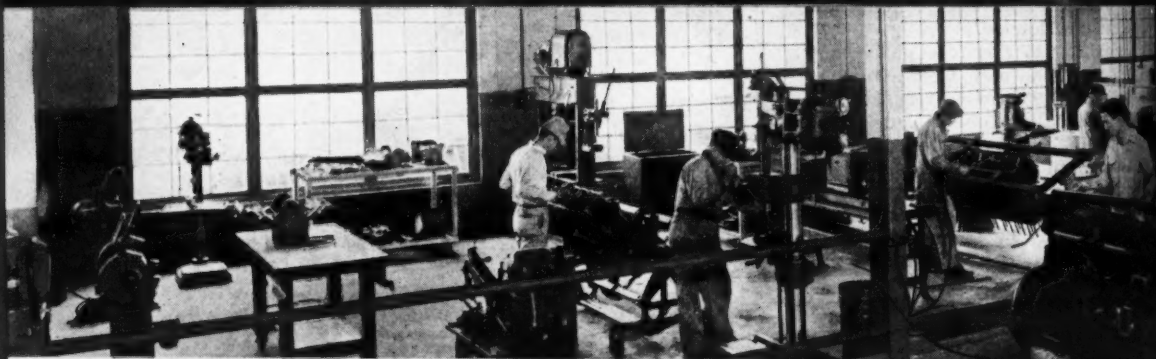
Mixing and Placing

A fleet of 25 batch trucks, each hauling two 37.4-cubic-foot dry batches, was ordinarily used to keep the 34-E MultiFoote paver supplied. This paver, spotted on the 8 to 10-foot shoulder at the side of the slab, was set up to reach any part of the 24-foot distance between forms with its 36-foot boom.

(Continued on next page, Col. 4)



International distributors maintain complete stocks of parts under a perpetual inventory control. This, plus nearby International parts depots, assures prompt supply of any needed part.



Factory-trained mechanics, using modern fixtures and tools, make sure of factory-level servicing, repairing and rebuilding of International engines. The engine department of a distributor's shop is shown above.



Shears, drills, lathes, punch presses and other powered tools are used in many distributors' shops for equipment repair or construction.

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POWER UNITS
DIESEL ENGINES
WHEEL TRACTORS

INTERNATIONAL



Construction-Machinery Costs Are Up 3 Per Cent

Continuing the upward movement begun after the end of the war, prices of construction machinery rose approximately another 3 per cent in the 3-month period April-June, 1947, the Bureau of Labor Statistics of the U. S. Department of Labor has announced. Construction-machinery prices in June were 12 per cent higher than in June, 1946, and almost 37 per cent above August, 1939.

The advance for April was 0.3 per cent; for May, 1.4 per cent; and 1 per cent for June. During this quarter, prices for scrapers, maintainers and graders, and track-type tractors rose approximately 5 per cent. Smaller in-

creases ranged from 2.8 per cent for material-processing equipment to less than 1 per cent for mixers, pavers, spreaders, and related equipment. Prices for drilling and boring machinery and for portable air compressors were unchanged.

Dippers and Shovel Parts

A catalog describing its line of power-shovel dippers and shovel and dragline parts has been put out by the American Manganese Steel Division of the American Brake Shoe Co., Chicago Heights, Ill. Bulletin No. 547-DS contains a detailed description of all the Amsco dippers. Cross-sectional drawings and X-ray photographs are used to highlight Amsco design features.

In addition to the dipper descriptions, a section of this new 40-page catalog is devoted to a discussion of austenitic manganese steel and its properties. Charts, photomicrographs, and comparison tables are used to show why this metal is desirable for use in dippers, and power-shovel and dragline machine parts.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 57.

Clark Joins Rosco Mfg.

Harold C. Clark has been appointed head of sales east of the Mississippi for the Rosco Mfg. Co. of Minneapolis. Mr. Clark was formerly head of the Road Machinery Division of Cleaver-Brooks.

Concrete Paving Is Slowed Up by Rains

(Continued from preceding page)

The batch trucks moved up close to the paver, turned around on closely spaced turnouts, and backed to the paver skip. At times they were able to come in one way, pass around the machine, and back in. A spotter at the paver gave signals for backing, and dumped the two batches.

Water was hauled to the paver by three 1,200-gallon tank trucks which got their water from the Arkansas River. A 6-inch Jaeger pump was used to pump the river water up to the trucks. When the water-tank trucks reached the paver, the water was transferred to a 750-gallon special auxiliary tank built on top of the paver. A 3-inch centrifugal pump on the paver made that transfer.

The concrete materials and water were mixed one minute in the paver, and dumped at an average slump of 2½ inches in about the center of the forms. The 30-inch ½-inch round steel dowel bars in the longitudinal center joint had previously been set out ahead of this operation, of course, when the subgrade sand blanket was finished. Clearance from the ground on these dowels was 3½ inches. Redwood expansion joints ¾ inch wide were also set with Star Lugs, spaced 120 feet apart, ahead of the pour.

As the concrete was placed around these expansion joints, it was carefully shoveled in by hand on both sides to get a dense fill and even loading on both sides of the redwood planks and around the dowel bars.

The first machine to handle the concrete was a Jaeger-Lakewood concrete spreader. This machine distributed the mix evenly over all the subgrade between the forms, carrying excess material on ahead. A vibratory screed attached to the spreader furnished surface vibration. Two small hand vibrators carried along at the sides of the forms were used to consolidate the concrete at that point with nice results.

When this combination had passed by, a Jaeger-Lakewood float-finishing machine was used to put the initial smooth finish to the slab. With double screeds and a surplus grout apron at the front, this machine made possible the initial dressing of concrete without laborer-puddlers. All surplus grout or laitance was carried on ahead by this machine.

A cutter wheel on the float finisher was fastened to the center of the frame to make the ½ x 2½-inch slot needed to take a strip of Keystone asphaltic joint material. The strips were set in place from a bridge behind the float finisher to make a straight weakened-plane joint along the center line of the slab. Similar material was used for contraction joints, with the slots cut by hand tools from a second bridge. All contraction joints were set in place 20 feet apart.

Hand Finishing and Curing

The surface of the slab was finished behind the Jaeger-Lakewood machine by two men handling long bullfloats. They worked the surface of the concrete over the joint materials, and dressed out any irregularities. The edges of the slab along the form line were also dressed with ¾-inch-radius edging tools. A final belt finish was put on as soon as the new surface had started to stiffen.

Just before the surface had stiffened to the point of initial set, but after the belt finish was applied, a 6-inch-wide center stripe made of black iron oxide was put down. A frame 6 inches wide was centered over the longitudinal center-line joint, the black material

(Concluded on next page)

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Concrete Paving Is Slowed Up by Rains

(Continued from preceding page)

sprinkled within the frame, and roughed in with a float. Black iron oxide seems to penetrate concrete about $\frac{1}{8}$ inch, and will seldom if ever wear out if properly applied.

Kapco curing compound was sprayed on the finished slab by a power rig. Forms were stripped the next morning after the pour by pulling the pins with hand jacks, cleaning the steel with square-point shovels, and moving them on ahead with a flat-rack truck.

The average rate of pour with this set-up was from 115 to 125 linear feet an hour, although one day 1,520 feet was poured in slightly less than a 12-hour run.

Batch Plant Used

By a peculiar and fortunate stroke of luck in selecting terrain, it was possible to set up the Blaw-Knox 100-ton aggregate plant and the Johnson 350-barrel bulk-cement silo in almost the exact center of the job. Rock aggregate, produced 15 miles away on Grand River near Fort Gibson, was shipped in 15 miles to the plant by railroad, using the SLSF and MK&T railroad lines.

Sand was produced at the Arkansas River and trucked in to the plant. Bulk cement was shipped in hopper-bottom cars from the Dewey Portland Cement Co. plant in Dewey, Okla. Cement was dumped direct to a screw feeder, which conveyed the bulk material to the storage silo. Cars of rock aggregates

were clammed clean by a Northwest 104 crane, using a 1-yard Williams re-handling clamshell bucket on its 45-foot boom. The material was stockpiled, and then during daytime pours re-handled to the Blaw-Knox plant.

General Superintendent Keith tells with amusement the story of how the Northwest crane was brought to the job. According to the best-informed construction men, this type of machine should never, never be loaded on a trailer without its boom installed, because its counterweight will almost certainly topple the whole machine off backward.

"I looked up one day and saw the low-bed coming in with this machine without a boom," Keith said, "and almost hit the ceiling. 'You can't do that!' I yelled to the driver."

"We've done it anyway," he grinned back. "We used a Cat to hold the front end down with a snub line while we loaded the rig, and put cribbing under the counterweight to steady it during shipment."

With the unit thus braced, it was simple to put the boom on at the job, according to Keith. "Don't ever let anybody tell you this stunt can't be done, because we did it."

This machine was called upon to handle about 1,000 tons of aggregates and 700 tons of sand on peak days. When pouring was being pushed in the few days of good weather available, three cars of cement were also handled to the bulk silo.

The 25-unit fleet of batch trucks, composed mostly of Fords, Chevrolets, and Internationals, was rented locally on a batch-haul basis. The dry ingredients were weighed out in the Blaw-Knox plant by Fairbanks scales,

dumped progressively to the weighing hopper, and all sand and aggregates went at one time to the trucks. Trucks drove through under the batch plant, but backed under the Johnson cement silo to get their loads of cement. Loads were covered by canvas, of course, to prevent loose cement from blowing away during the 5-mile ride.

Batches figured for a yield of 37.4 cubic feet were weighed out according to a design of 3,000 pounds of rock aggregate, 1,642 pounds of sand, and 677 pounds of cement.

Maintenance Built In

Many of the items which were left for maintenance crews to do not many years ago are now a part of contract operations, according to Keith. The shoulders will be carefully built and compacted from 8 to 10 feet wide, and given a start of good sod. All right-of-way is being neatly dressed.

"The present-day paving contractor has to be a concrete technician, a plumber, pipe fitter, and everything else

at times," said Keith, pointing out the variety in present-day paving-construction trends.

Personnel

Keith was assisted in the field by George Pettaway, Slab Superintendent; H. E. "Shorty" Ward, Master Mechanic; and N. Burgess, Grade Foreman. William H. Bell was the Resident Engineer. All operations were under the general supervision of H. E. Bailey, State Highway Engineer-Director, and State Construction Engineer J. J. Stobaugh, Jr.

Armco Elects Officers

The advancement of three of its officials to higher positions has been announced by Armco Drainage & Metal Products, Inc., subsidiary of The American Rolling Mill Co., Middletown, Ohio. S. R. Ives has been elected President; M. C. Patton has been elected Executive Vice President; and H. D. Neill has been elected Vice President in Charge of Sales.

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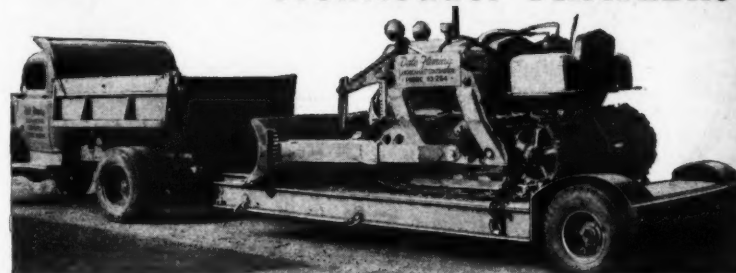
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Safety coupling pin is inserted and dump body is lowered. Your Tagalong is now ready to roll.

PATENTS PENDING



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Body elevated. Tightened cable has raised drawbar and engaged towing tongue. Safety coupling pin is inserted. Trailer is ready to roll when body is lowered.

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This is Baughman's standard 11-foot Model ASK-2 self-unloading body with spreader attached. It can be used for dumping rock; spreading sand, cinders, salt, and other materials; rebuilding road shoulders; stockpiling, etc.

New Truck Body Is Self-Unloading

A specially designed body is made by the Baughman Mfg. Co., Inc., Jerseyville, Ill. Used with special Baughman auxiliary equipment, the Model ASK-2 self-unloading body can be used for dumping rock; spreading sand, cinders, salt, and other materials; rebuilding road shoulders; stockpiling materials; and, with side and rear conveyors, for transferring its load directly to another vehicle.

The Model ASK-2 and Model ASK-2B (with belt) bodies are made in lengths of from 9 to 25 feet. Power is obtained from a power take-off, or the unit can be motor-driven. With standard equipment, it will spread from 30 to 45-foot widths. The body can be furnished with standard or with special steep sides. Capacities vary from 9 to 17 cubic yards.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 31.

Electric Impact Tool

A new electric impact tool has been made available by the Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y. Outstanding feature claimed for the Model 4U is a mechanism said to permit the spindle to be stalled completely while the motor continues to run; thus it eliminates motor burn-outs caused by overloading.

Using standard attachments, it will apply and remove nuts, drive and remove screws or studs, drill, ream, tap, and perform similar operations requiring an impact tool. It is powered by a specially designed reversible 3-amp electric motor. Free speed is 2,000 rpm, and it is said to deliver 1,900 rotary impacts per minute, under load. The motor operates on a 110-volt ac or dc current.

The manufacturer states that in operation, the impact tool runs the same as any conventional electric tool. But when the resistance to spindle rotation reaches a certain amount, a patented mechanism converts the power of the motor into rotary impacts.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 43.

Small-Tool Air Hose

A lightweight air hose for use with small air-operated tools is made by the Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N. J. Designated as Ray-Man, it is made in sizes from 1/4 to 1/2 inch. The hose features strength members made of rayon

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and the Homo-Flex type of construction. It is available also in an oilproof type.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 9.

Data About 3-Axle Roller

An announcement describing the KX-25 3-axle tandem roller is available from the Buffalo-Springfield Roller Co., Springfield, Ohio. Bulletin No. S-51-47 describes the development of the 3-axle tandem, and its design and operation.

The KX-25 has a weight of 12 tons which can be increased to 18 tons by means of ballast. The bulletin describes the transfer of weight from one roll to another when a high spot is encountered, the synchronized steering to avoid scuffing when corners are turned, the 4-speed transmission, and other features of the unit.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 51.

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Note the illustration . . . see how easy it is for the welder to reach up and adjust the fine welding heat of his Hobart Arc Welder. Remote Control saves him both time and effort, eliminates unnecessary steps to the machine to make heat adjustments. Leaves more time for welding . . . less for walking. Removes temptation to get by with incorrect welding heat, insures sound welds and more production. Let us show you Hobart's many other advantages, how you can get more welding at lower costs. Write today!

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Irrigation Project Pushed by Contract

Excavation and Concrete Lining of Small Canals Are Features of USBR Work; Some Job Problems

★ BY using special shop-built machines on standard Buckeye ditchers and Koehring road-machine frames, the H. B. Zachry Co. of San Antonio, Texas, rapidly brought to completion the first stage of Balmorhea Irrigation Project in western Texas. By April 1, 1947, some \$380,000 worth of work had been finished, and with it one of the smallest and most interesting projects ever studied by the U. S. Bureau of Reclamation.

If the Balmorhea Project is ultimately enlarged, that enlargement can consist only of increasing water storage for the valley and some revision of the canal lateral system. The recent Zachry contract will gather much of the available water in this region, carry it through the upper portion of the project lands with a minimum transmission loss, and store what remains after irrigation in Lower Parks Reservoir. Should Congress approve further expenditures in the future, the Lower Parks dam and dike may be raised to allow one or two years' irrigation supply to be stored there.

As the situation now stands, available water in winter fills Lower Parks Reservoir to its storage capacity of 5,200 acre-feet, and then escapes over the spillway towards the Pecos River Valley. In late summer, when the water is badly needed, the supply is frequently low.

Balmorhea Project History

The Balmorhea Project will distribute about 100 cfs of water, at peak flow, entirely from springs. These great natural rivers of pure, cold water gush from the earth in many places in west Texas. The spring at Balmorhea State Park gushes forth about 26,000,000 gallons daily, and several other springs in that vicinity are a source of constant supply.

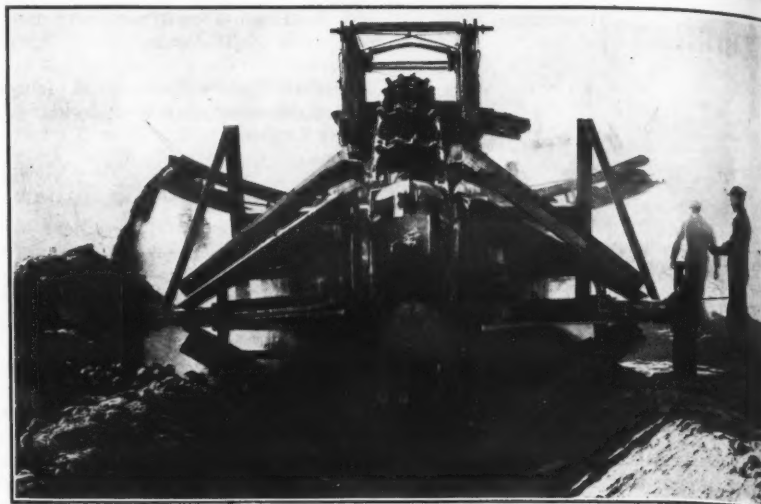
In 1850 the first pioneers began to water stock and raise a few crops from this water. After the Civil War some primitive irrigation was started to raise hay for Army horses at Fort Davis and Fort Stockton. In 1915, private capital started the first modern reclamation work in the valley, and a main distribution canal was built. Some of the water

was controlled by private ownership, however, and the distribution canals lost up to 30 per cent of the water they carried in transmission.

There was a reason for this loss. The Balmorhea Valley, at the foot of the Davis Mountains, is a thin crust of topsoil set on a deep layer of well drained gravel and porous rocky limestone formation. Any water that escapes from the topsoil is lost to irrigation.

Citizens in the valley realized that about 10,400 acres were potentially irrigable, if a tight distribution system could be built. They requested the Bureau of Reclamation to make surveys and studies, and by 1944 the project was pronounced feasible and funds for contract work were allocated.

The war forced a temporary halt, but



U. S. Bureau of Reclamation Photo

This close-up shows the rotary template and buckets mounted at the end of the excavating boom of the Buckeye ditcher which Zachry Co. used on the Balmorhea job.

in 1946 the job was reopened under the amended WCU Act of 1939. The Zachry

Co. was low bidder on the two scheduled contracts. (Continued on next page)

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Irrigation Project Pushed by Contract

(Continued from preceding page)

ules of the project, and began work October 1, 1946. The job included the earth work, canal lining, and structures of the Phantom Lake Canal and the Inlet Feeder Canal leading to Lower Parks Reservoir.

Capacity of the Phantom Lake Canal is 25 cfs for 4.2 miles, and the Inlet Feeder to Lower Parks Reservoir will carry 100 cfs, or the total water from several sources. The Balmorhea Project portion just constructed is only about 8 miles long. It has some slopes as steep as 0.002, and water velocities as high as 12 fps.

An important part of the project was the purchase of a canal right-of-way and certain water rights to Phantom Lake spring, owned for many years by the Kingston family. The Bureau made several concessions to Joe Kingston in its design. It installed a power drop at the edge of Mr. Kingston's yard, so that he might install his own 1½-kw hydro-electric system. It also designed rubble-masonry lining for the section of the upper canal which passes through Mr. Kingston's yard.

Construction Problems Difficult

Construction of the canal required digging through rocky, stump-filled soil. It meant excavating a tiny ditch only 4 feet wide on the bottom at its largest dimension, only 3 feet deep, and shaping 1¼ to 1 side slopes. It meant placing a Class A concrete lining, reinforced by 6 x 6 No. 6 mesh, in that small section.

From the Bureau of Reclamation point of view, it meant designing a sulphate and alkali-resisting concrete, because the water in that region contains sulphates and harsh alkalies which are detrimental to ordinary concrete. Some masonry work in the old canal is practically eaten away.

The designers had to plan a job that would be sturdy but plain, strong but inexpensive. It had to be a job that could be finished in short order, but whose cost could be amortized successfully by the valley water users. Those are the conditions which formed a big part of the background of the Balmorhea Project.

Canal Excavation

The earth quantities for canal excavation were largely balanced. Borrow was necessary in a few places. In most locations, excavation from the ditch was used to shape the levee shoulders and a 1-foot topping above the top of concrete.

An 8-cubic-yard LeTourneau Carry-all, towed by a Caterpillar D7 tractor, was used for all borrow and fill material. Dirt hauled in by this machine was laid down in 6-inch lifts, watered by a water-tank sprinkler, and sheep-foot-rolled to about 95 per cent of optimum density.

The major part of the canal, however, called for an open cut down through accessible land. A Buckeye ditcher was rigged up specially for this job, and a template wheel conforming to the outline of the ditch was built. Old motor-grader blades and the cutting edges of scrapers were fastened on this template frame to do the cutting.

The blades were designed to scrape the earth towards the bottom of the canal, where a large part of it could be picked up by the regular excavator buckets on the large round ditch-digging wheel.

A drag scoop was placed just behind the template wheel to catch any loose earth and keep it within reach of the buckets. At first this secondary excavation was done by hand labor, but

the cost was prohibitive and Superintendent J. L. Roberts had a welder build this drag.

The ditcher was kept on line by plumb bobs hanging above an offset string line, in the same manner that the Buckeye ditcher aligns itself on pipeline work. Since it was very important that the ditcher be level, a special roadway was bladed by an Adams motor grader ahead of the machine.

Soil with a very high boulder content was successfully excavated by this shop-built adaptation, and some stumps from mesquite and greasewood were removed. In a few places where extremely tough rocky digging threatened to beat the ditcher to death, Roberts pulled it off and dug those places with a small Osgood ½-yard dragline. In ordinary digging, the Buckeye ditcher crawled along at a pace of 55 to 60 feet per hour.

A standard Koehring highway bullfloat was cut down, and rebuilt to carry a specially constructed catling frame to conform to the ditch side slopes and



U. S. Bureau of Reclamation Photo
Looking downstream from Station 93+00, we see workers laying track along the Phantom Lake Canal line to be used by the wheel-mounted slip form and trimmer. The track consists of Hotchkiss highway paving forms.

bottom. It was mounted on the Koehring frame, and its engine was replaced by a 4-cylinder Willys and a gear-reduction train. A winch was also installed to help pull the trimmer along

if necessary.

This machine was used in the same manner that highway subgrades are trimmed in advance of concrete pours.

(Continued on next page)

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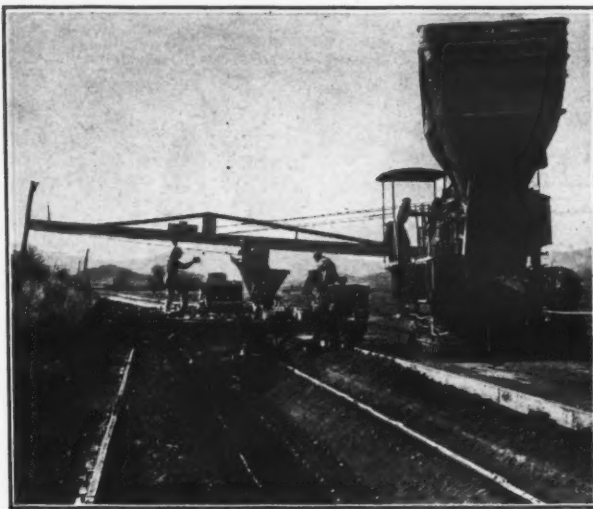
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MERCED IRRIGATION DISTRICT serves 164,000 acres of diversified croplands, maintains 723 miles of canals, over 5,700 structures, 50 miles of drainage channels, 106 drainage wells and a dam and hydroelectric plant on the Merced River.



U. S. Bureau of Reclamation Photos

At left, a section of Phantom Lake Canal on the Balmorhea Project is ready for lining. A MultiFoote 34-E paver is in operation. It dumps directly to the slip form shown in the center photo, which distributes the concrete 3 inches thick over the sides and bottom. Finishers, above, smooth off the lining.

Irrigation Project Pushed by Contract

(Continued from preceding page)

Excess dirt loosened by this trimmer was shoveled out of the canal prism by hand labor.

Canal Concrete

A special slip form was built under a Koehring Longitudinal Finisher frame, to take the concrete lining and distribute it 3 inches thick over the canal sides and bottom. A Willys 4-cylinder gasoline engine was installed for drive power to the wheels, and an Onan electric generating set was installed for vibration power. No. 200 Syntron magnetic vibrators were attached to the slip forms forward; some attempt was made to vibrate the concrete internally.

The slip form and trimmer were wheel-mounted, and rode on a set of Hotchkiss highway concrete-slab forms placed to line and grade on the top of the canal banks.

Concrete aggregates and sand were shipped in by railroad, unloaded by an Osgood ½-yard clamshell to a Johnson batching plant at the town of Toyahvale, near the center of the job, weighed, and taken to the job in a six-unit fleet of two-batch trucks. The concrete was batched for lining on the basis of 1 part of cement, 2.16 parts of sand, 1.62 parts of ¾ to 1½-inch aggregate, and 1.76 parts of 3/16 to ¾-inch

aggregate.

Concrete was mixed by a MultiFoote 34-E paver, and dumped directly to the receiver on the slip form. Longhorn portland cement in bags was added at

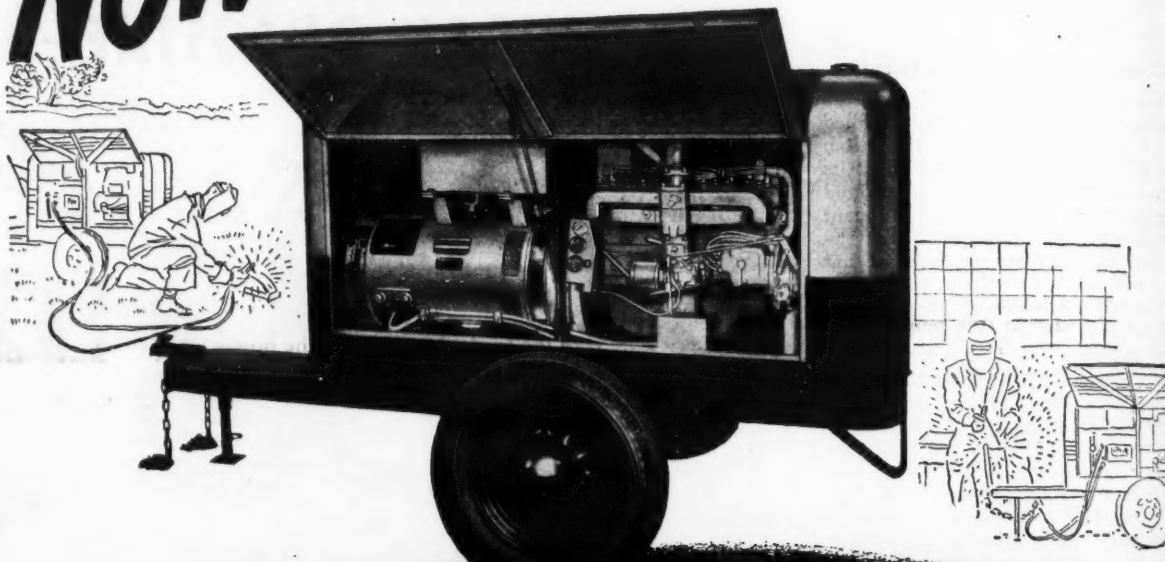
the paver, and mixing water was hauled in by tank truck. The water-cement ratio was approximately 310 pounds for a 4,100-pound batch.

As the slip form moved along at the

rate of 100 feet an hour, six finishers with bullfloats worked the concrete surface to its ultimate density. Dummy contraction joints were cut every 6 feet

(Concluded on next page)

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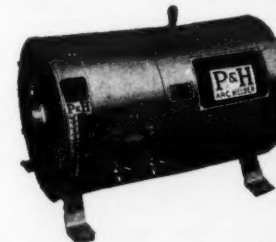
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U. S. Bureau of Reclamation Photo
R. J. Walter, Jr., was the Construction Engineer in charge of the Balmorhea Project for the U. S. Bureau of Reclamation, with headquarters in Balmorhea, Texas.

a quart of Vinsol resin solution were added at the mixer. The concrete was hauled by wheelbarrow, and placed with the aid of a Syntron concrete vibrator. All structure pours stripped out in excellent shape.

Bad Weather Slows Work

One of the worst winters anyone in western Texas can remember for the past 25 years chose this construction season to unleash the havoc of snowstorms, a blizzard, and sub-zero weather. Pouring stopped and the job was slowed down until good weather.

When the snow melted, access roads were rutted and rough. It was a long, hard battle with the elements to dig this 23,500 cubic yards of excavation and pour the 7,300 cubic yards of concrete, but the battle was won. And the efficient water-distribution system people near Balmorhea have dreamed of for years is a reality.

Compared to the Central Valley Project of California, this job was small indeed, but in importance to the com-

munity at Balmorhea, it will measure up to those projects in the far west. About 7,140 acres are presently irrigated, 10,400 acres are planned in the ultimate program. It is more than likely that no new land can be developed at Balmorhea, because the water supply is so well defined.

Personnel

The Balmorhea Project was designed

and administered by Region 5 of the U. S. Bureau of Reclamation at Amarillo. R. J. Walter, Jr., was the Construction Engineer in charge, with K. O. Vartia as Field Engineer.

J. L. Roberts was in charge of construction for H. B. Zachry Co., with Royce Caldwell as Office Manager. Cecil B. Morris was Structure Foreman and Pablo Martinez was Concrete Lining Foreman.

Irrigation Project Pushed by Contract

(Continued from preceding page)

in the 25-cfs canal and every 10 feet in the larger ditch. They were filled with asphaltic mastic compound, and dressed smooth. The concrete surface was sprayed with Sealtext curing solution, with white pigment added.

In order to combat the sulphate and alkali condition in the water, and to entrain about 3 per cent of air in the concrete, Vinsol resin was added at the mixer on the basis of a 1 to 100 solution.

Ordinarily the small batches of this solution were prepared by adding 16 pounds of water to 0.68 pound of sodium hydroxide, stirring the solution while the water was being poured. Four pounds of Vinsol resin was then added very slowly while the solution was stirred rapidly. The mix was allowed to stand from one to two days to dissolve.

It was then dumped into a mixing keg, and the residue in the bottom of the pail was heated to about 180 degrees while a small part of 50.6 pounds of water was added to complete the dissolving process. The rest of the solution and the remainder of the 50.6 pounds of water were then all poured in the mixing keg, and stirred to complete the blending process.

This concentrated solution was then diluted 5 to 1 in the field to arrive at the 1 to 100 proportion designed. A quart of the diluted mix was added at the mixer to each batch, where structures were being poured by a Jaeger 1/2-yard mixer. And 4 quarts were added to each 6-sack batch for lining at the MultiFoote paver.

Structures

There are a number of standard structures in the Balmorhea Project, including a Parshall flume at Phantom Lake intake, a power drop at Joe Kingston's, and several checks and turnouts. The special excavation for these structures was taken out by dragline, or by hand.

No plywood was available for form work, so ordinary shiplap had to be used and the roughness taken out by rubbing. The Zachry people, who have been highway builders in Texas for many years, imported highway-culvert form builders to do the carpentry. No carpenters with reclamation-structure experience were available. The project made much better highway-structure carpenters out of these men, according to Superintendent Roberts.

Structure pours were made by weighing the concrete batches on a set of Fairbanks beam scales at a Jaeger 11-S mixer. Longhorn bag cement and

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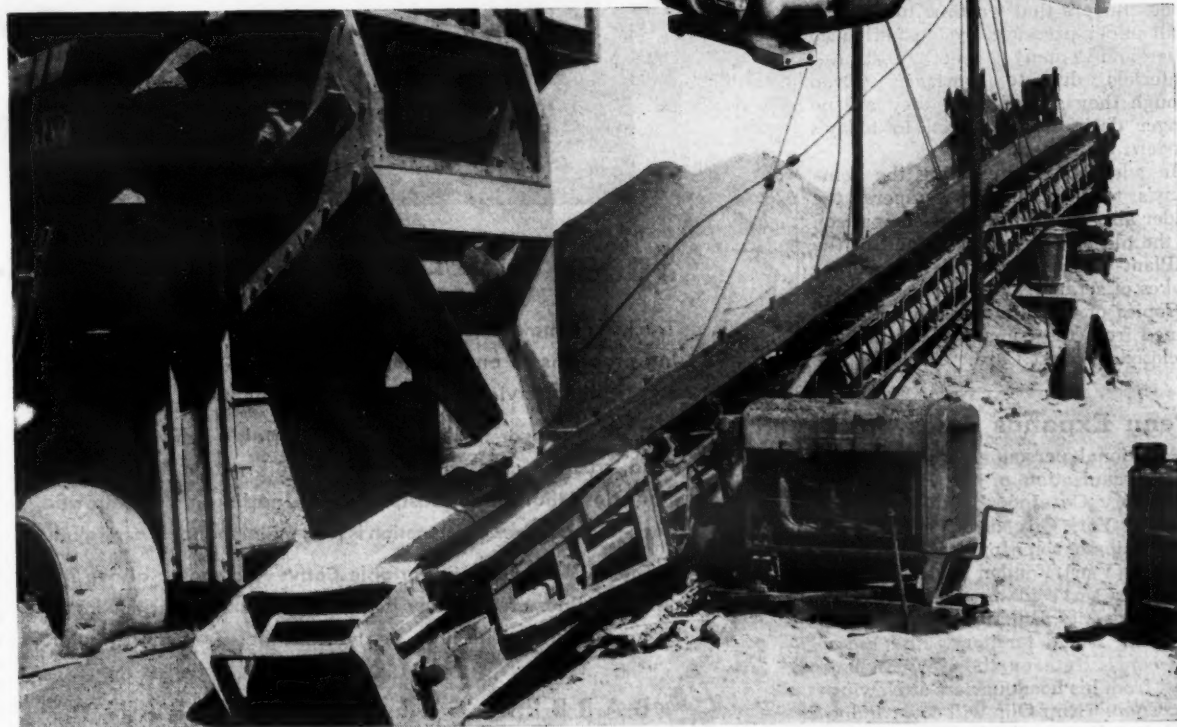
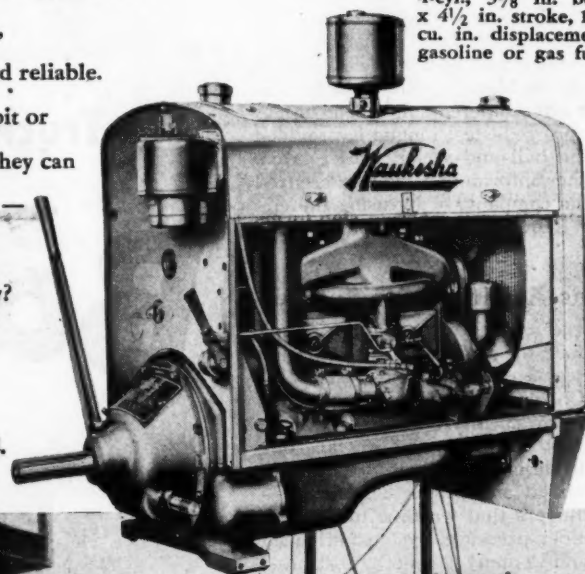
for time out. And do it all with less fuel. Why?

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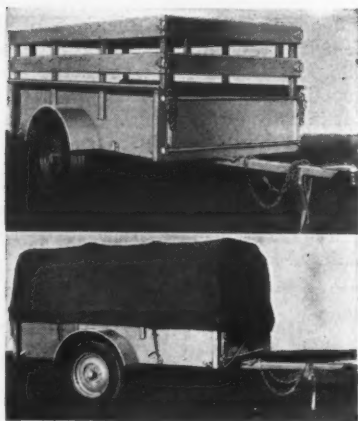
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WAUKESHA ENGINES



The Cobey trailer made by the Perfection Steel Body Co. comes in a 6 and an 8-foot-long size. Three body-extension units are available for the 8-foot unit—a 22-inch stake rack, a 46-inch stake rack, and a bow top with tarpaulin cover.

Two-Wheeled Trailer

A two-wheel trailer for hauling bulk materials and other supplies is made by The Perfection Steel Body Co., Galion, Ohio. The Cobey trailer comes in a 6 and an 8-foot-long size, with three body-extension units available for the 8-foot unit; a 22-inch low stake rack, a 46-inch high stake rack, and a bow top with tarpaulin cover. Both sizes are 4 feet wide, and have 17½-inch flared steel sides.

End gates are provided on both front and rear of the trailer. These gates swing from either the top or bottom and can be used to dump bulk materials. When both gates are dropped they line up flush with the floor giving an additional amount of floor space. The floor is made of 14-gage ribbed steel. The wheels have tapered roller bearings. A heavy pressed-steel tongue is provided with the ball-and-socket trailer hitch.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 26.

Warns Against War Surplus

A large folder warning scraper buyers against the purchase of war-surplus equipment has been issued by the LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa. In it, LaPlant-Choate states that war-built scrapers are obsolete in design and, therefore, are not a bargain at any price. The firm reminds buyers that wartime units were built under pressure, by inexperienced labor, and in many cases of "substitute" materials, due to shortages. Even though they served well, they are no longer desirable compared to today's modern equipment.

In addition to presenting the company's modern line of scrapers, the folder also makes a tabular comparison of the old and new models, and of the LaPlant-Choate versus four other makes of scrapers.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 69.

Penn Expands Sales Staff

Additional personnel has joined the sales organization of the H. O. Penn Machinery Co., Inc., E. River & 140th St., New York City, dealer in construction equipment and materials.

M. J. (Van) Vanden Bosch has been named to serve in the coastal area of New York City. Bill Morrison will serve the Long Island territory. Phil Pierce will concentrate on the New England coast from his headquarters at Newington, Conn. Bruff Olin will cover industrial installations in Sullivan, Ulster, Rockland, and Orange Counties, N. Y.

An additional sales representative for Nassau and Suffolk counties is Orrin Mac Murray. Walter W. Nieber, who formerly covered this territory, has been transferred to Westchester Coun-

ty, N. Y. Frank L. Petersen will serve industrial plants in the New York City area.

Earth-Boring Equipment

Its latest catalog showing the Ka-Mo line of earth-boring equipment in action is now available from Ka-Mo Tools, Inc., 2121 So. Troy St., Chicago 23, Ill.

This 8-page bulletin is made up largely of pictures which show the equipment in use for vertical and horizontal drilling—digging post and sign holes, testing subgrades, testing earth formations prior to excavation, pre-boring for piling, drilling for grouting, digging sump holes for pumps, laying underground conduits and pipes, etc.

The catalog also describes the Ka-Mo tools, and accessories for use with them, listing their applications. And it tells of the advantages of both the air and the electric units.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 86.

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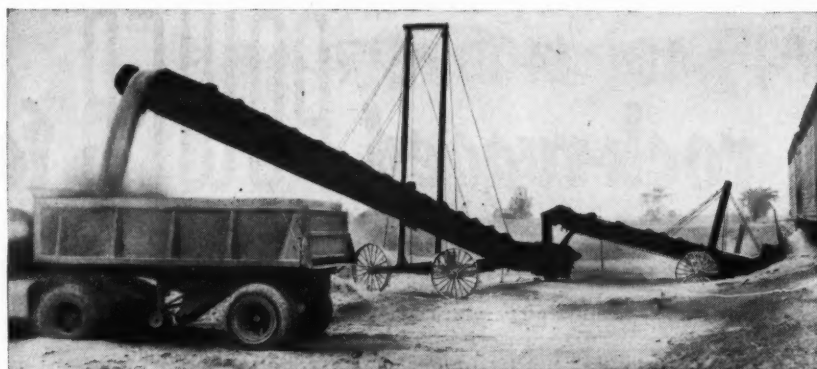
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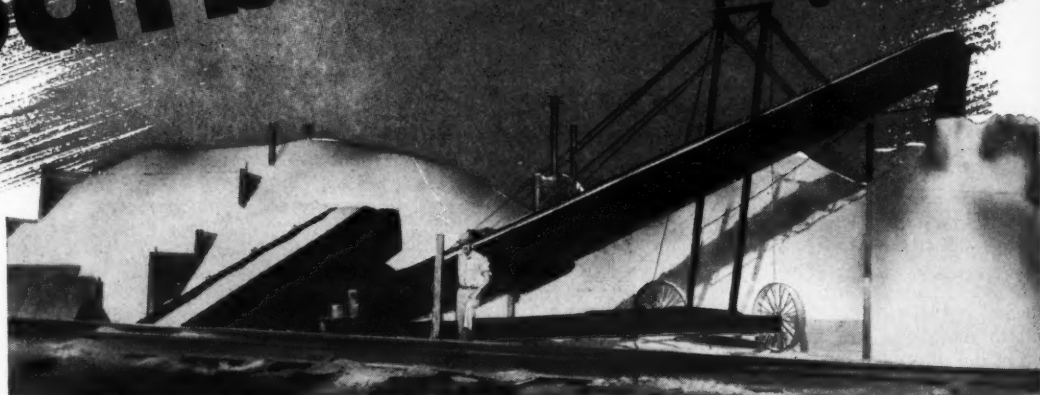
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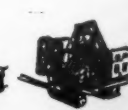
COAL MACHINES



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DITCHERS

Old Road Relocated With Heavy Grading

Tractor-Scraper Units Handle Short Hauls; Base Of Select Material Laid For Concrete Paving

• A 7.4-MILE stretch of U. S. 165, or State Route 14, in central Louisiana is under construction entirely on new location. The project is in Grant Parish. It begins 5½ miles above Pollock and continues northwards to a point on the existing road just south of Georgetown. Marked by heavy grading — 710,228 cubic yards — the new road is being paved with concrete laid on a 0.9-foot base course of selected material extending the full width of the roadway.

The Louisiana Department of Highways awarded a contract for the project to the Central Construction Co. of Monroe, La., on its low bid of \$882,285.64. Work started in April, 1946, and was scheduled for completion within 250 working days. The time limit was extended, however, because of the severe shortage at that time of the necessary reinforcing steel for the drainage structures.

Before any progress could be made on the grading, the numerous culverts first had to be constructed, and lack of steel held up this work. A scarcity of earth-moving equipment also delayed the contractor. By the end of 1947 the entire job, including the paving, should be completed.

The original 20-year-old highway was located 25 miles north of Alexandria, the hub of several Army training camps during the war. It had been badly battered from heavy military traffic. Its 18-foot bituminous-treated surface on a sand-clay base was extremely rough and full of holes. The 4-foot shoulders were rutted, eroded, unstable, and too narrow for safe parking. Naturally maintenance was costly and practically continuous during training maneuvers when heavy convoys of trucks and tanks pounded over the road day after day.

New Location

The new road is cut through the woods lying east of the existing highway. In addition to being 1.7 miles shorter than the old road, it also eliminates 18 curves.

To reach the new line, several access roads from 1 to 2 miles long had to be built. The trees and brush were cleared away, and a roadway rough-graded by dozers and motor graders so that equipment could be brought to the site. While the new right-of-way is 200 to 300 feet wide, clearing was done only to about 10 feet beyond the construction limits. Natural growth was left standing wherever possible in the interests of roadside appearance.

The new roadway is 42 feet wide. On it a 22-foot concrete pavement is being laid, flanked by 10-foot shoulders. From the shoulders, 4 to 1 slopes run down to 4-foot flat-bottom ditches, while the backslopes are 3 to 1. The concrete slab is 6 inches thick except for the 3 feet along the edges where the depth is increased to 9 inches. The base course under the pavement is a sandy material, A4 quality or better, running out to the slope lines. All fill sections are sloped 4 to 1, but even on this gentle gradient the soft Louisiana soil erodes easily.

Consequently the shoulders and front slopes are to be mulch-sodded while the backslopes and ditches will be slab-sodded. The contractor plans to buy the slab sod locally. For the mulch sodding, he has leased a 60-acre field and planted Bermuda grass. The top 4 inches of soil and grass roots will

later be plowed up and scattered over the area to be mulch-sodded. A Cultipacker will be used to tamp the roots into the soil.

Bridge and Drainage Structures

Two fairly large streams cross the new right-of-way. One of them, Little Creek, is contained in a 4-barrel 12 x 12-foot culvert of reinforced concrete 45 feet long. The other, Fish Creek, is spanned by a 504-foot reinforced-concrete deck-girder bridge made up of fourteen 36-foot spans supported on concrete-pile bents.

Both structures were built a few hundred feet south of the existing streambeds so that construction proceeded in the dry. When they were completed, the creek channels were diverted to



C. & E. M. Photo

A Caterpillar D7 pulls a LeTourneau scraper as it fills its bowl with material from a borrow pit on the Central Construction Co. grading contract.

pass through the new structures, while the old streambeds were filled in.

The bents on Fish Creek bridge consist of seven 16-inch-square concrete

piles spaced 5, 5½, and 4 feet respectively from the middle pile on the center line of the bridge. The 25-foot piles

(Continued on next page)



"When we were awarded this contract, we had to buy additional equipment to handle some of the earth-moving problems involved without any lost motions. The investment would have placed a heavy strain on our working funds, so we asked C.I.T. to help us make the purchase.

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Old Road Relocated With Heavy Grading

(Continued from preceding page)

were cast at the site with a 2-bag mixer. A subcontractor, Carl Allen of Elton, La., drove them at the rate of three bents every two days. The driving rig worked from I-beams supported on rails fastened to timber sections. It consisted of an American whirley with an 80-foot boom and 60-foot leads for the Vulcan No. 1 steam hammer. Steam was furnished by a 120-hp oil-burning boiler which was filled with water pumped from the creek by a Sterling 2-inch pump.

The piles were driven to a 40-ton bearing without jetting, although a bearing of only 28.7 tons was required. The job could easily have been done with a smaller driver. But as this rig had just been used on another bridge project, it was moved to this contract and left as it was, without shortening the boom or leads.

After the piles were driven to grade they were capped with 24-inch-deep x 39-inch-wide x 32-foot-long concrete members. On these rest the five reinforced-concrete girders, 14 inches wide x 2 feet 9 inches deep, which support the 7-inch deck slab. The structure has a clear 28-foot roadway.

The other drainage structures range from 3 x 3 culverts up to a triple 8 x 8 and a double 10 x 10-foot box culvert 45 feet long. All culverts have flaring headwalls with the wings on 4 to 1 slopes. A SkilSaw 8-inch and a Mall 12-inch power saw cut the form lumber, working on current furnished by Kohler 1½-kw generating plants. Norlund frog grabs were found useful in picking up objects that had fallen into the forms, such as bits of wood, tools, etcetera.

On the smaller structures the concrete was mixed in a Jaeger 16-S mixer. Two 27-E pavers, a MultiFoote and a Koehring, were used for the larger pours. Each of the pavers discharged into ½-yard concrete buckets. These were lifted to the forms by a Speeder crane with a 35-foot boom and a Koehring crane with a 45-foot boom.

Grading

Most of the material encountered in the grading was a mixture of sand and

clay, except in one locality where some soft sandstone was found, a rather unusual event in Louisiana. A ledge of this rock runs across the Pelican state from the Sabine River at the Texas border to the Ouachita River east of Alexandria. It was easily removed, without blasting, by a LeTourneau Rooter which turned the material over, loosening it so that the scrapers could pick it up.

The largest earth-work item was the 367,369 cubic yards of common excavation. The excavation for drainage structures was 32,853 yards. For the selected-base course and fills, 342,859 yards of borrow was required. The contractor provided his own borrow pits. These were required to be 300 feet back from the right-of-way limits and to be well screened from the roadway. In this way the scars of construction are concealed from the traveling public.

The borrow pits were established at the various balance points of the earth work. This was done so as to keep the



C. & E. M. Photo

Looking south down the new location for State Route 14 in central Louisiana, we see a culvert being built to carry Little Creek. On the near side is a MultiFoote 27-E paver with skip raised.

hauls within 1,000 feet as much as possible. The short hauls were not altogether feasible, and in three sections material had to be moved 2,000 feet. At the large bridge some 35,000 yards had to be hauled 3,000 feet from a borrow pit to complete the fill.

Dirt for the long hauls was excavated

by a Koehring 401 dragline with a 50-foot boom and a Yaun 1-yard bucket working in the borrow pits. The material was moved in three Caterpillar DW10 wagons averaging 10 yards of pay dirt, and five Ford trucks carrying about 4 yards.

For the shorter hauls under 1,000 feet, tractor-scraper units were employed. Two 12-yard and four 6-yard LeTourneau scrapers, pulled by Caterpillar D8 and D7 tractors respectively, moved an average of 600 yards per unit in a 10-hour working day. In the roadway excavation the deepest cut was 28 feet and the highest fill was 24 feet, but these sections seldom exceeded a few hundred feet in length.

The fills were built up in 8-inch lifts and compacted by three sheepfoot rollers pulled by light Caterpillar tractors. Grading was done by three tractor-dozers, two D7's and a D8, and a Caterpillar motor grader. The select material to make up the 0.9-foot base course was obtained either from the

(Concluded on next page)

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Old Road Relocated With Heavy Grading

(Continued from preceding page)

borrow pits or from cuts where an A4 or better soil was obtained. It was spread in two 6-inch layers, and also was compacted by the sheepsfoot rollers to the required thickness.

Concrete Pavement

By August the grading was sufficiently along so that paving could begin. A batch plant was set up at Howcutt, just east of the center of the job on a siding of the Missouri Pacific Railroad. Aggregate is contained in a Johnson 72-ton 2-compartment bin equipped with a beam scale on each of the two measuring hoppers. Sand and gravel for the 1:3½:5½ mix is supplied by the LaSalle Materials Co., Inc., from a local plant set-up at Pollock. Trucks deliver the material in stockpiles on either side of the bin. A Koehring 301 crane with a 40-foot boom and an Owen ¾-yard clamshell bucket charges the bin.

Bag cement is supplied both by the Lone Star Cement Corp. plant at New Orleans, La., and by the Arkansas Portland Cement Co., Okay Junction, Ark. The cement is stored in the boxcars which bring it to the siding until ready for use. About 20 Ford trucks holding two batches each first run under the aggregate bin for a load of sand and gravel, and then drive past the cement cars to pick up the required number of bags. The bags are not opened until they are dumped in the skip of the paver. Water for the mix is pumped from local streams by a C. H. & E. No. 11 4-inch triplex pump through a 2-inch pipe line which has a maximum length of 2 miles.

There are 8,000 feet of Heltzel steel road forms on the job. They are set up 22 feet apart since full-width slabs are poured, with the 27-E paver working between the forms. A Ben Flynn subgrader gives the final touch to the subbase before the setting of the joint assemblies.

Expansion joints are 120 feet apart with the contraction joints on 20-foot centers. Cypress wood, ¾ inch thick, in two sections, is used at the expansion points, and held in position by assemblies manufactured by Meadow Steel Products, Inc., of Birmingham, Ala. They also support the ¾-inch round dowels, 18 inches long, placed at mid-depth in the slab on 1-foot 3-inch centers.

Similar assemblies and dowels are used at the contraction joints, but of course the wood is omitted. A 2-inch groove, ¼ inch wide, is cut in the concrete at 20-foot intervals and rounded off with a ½-inch-radius tool. Asphalt filler is later poured into these joints.

A Meadow longitudinal center-line joint of the key type is also used with ½-inch round transverse bars, 2 feet long, on 2½-foot centers. The metal joint is made of ½-inch stock and the key itself is 1½ inches deep at the center of the form. No mesh reinforcing is used in the pavement which has a center crown of 1 9/16 inches.

The concrete is struck off by a Blaw-Knox double-screed finisher, but the longitudinal finishing is done by hand. Curing is effected with wet cotton fabric.

Quantities and Personnel

The major items in the contract include:

Clearing	129 acres
Excavation, common	367,369 cu. yds.
Excavation, drainage	32,853 cu. yds.
Excavation, borrow—sub-base and fills	342,859 cu. yds.
Slab sodding	136,603 sq. yds.
Mulch sodding	33,554 cu. yds.
22-foot concrete pavement, 9-6-9-inch	94,309 sq. yds.
Structural concrete	3,335 cu. yds.
Concrete piling, 16-inch-square	3,220 lin. ft.
Reinforcing steel	503,734 lbs.

An average force of 45 is employed by the Central Construction Co. under the supervision of R. R. Rupe, Superintendent. O. D. White is Resident Engineer on the project for the Louisiana Department of Highways which is headed by P. A. Frye, Director. N. E. Lant is Chief Engineer, and R. B. Richardson is Construction and Maintenance Engineer.

Battles Record Weed Crop

A long rainy season has produced a record weed crop in the state of Oklahoma. Because of the abundance of these weeds, the State Highway Department has called upon the assistance of approximately 150 mowers on full-scale operation.

Its efforts have been greatly appreciated by hay-fever sufferers, but there has been one note of discord—the bee keepers, who have raised their voices in protest against this mass killing. They have requested the Department to adopt some means to spare clover and flower-bearing plants that give off the juice the bees want.

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crack, crumble, curl or loosen. Also patches concrete to a perfect feather edge. Heavy loads on steel wheels actually improve it. Five-year-old floors show no wear. Used by largest railroads and industries in America. Over 600 contractors have found Plastic Rock a good-will builder and profit source. No special equipment needed. Not for home use.

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SERVICE FROM COAST TO COAST



The type of work that is done by a shovel, crane or dragline places it in a class by itself when it comes to taking punishment. Heavy excavating, overloading, improper care all take their toll. We at LIMA go the limit to build equipment that will withstand a normal amount of rough usage but regardless of how well a machine is built, there are times when parts must be replaced. Our interest in a customer does not end with the sale and delivery of a shovel, crane or dragline. We are ever ready to serve you at a moments notice as long as the machine is in service. A complete record of each machine we build is preserved so that when a part is ordered the customer can be sure that it will fit accurately. Parts are shipped the same day the order is received whenever possible. Special attention will be given to your request for parts service from headquarters located in the cities shown on the above map.

LIMA LOCOMOTIVE WORKS, INCORPORATED
Shovel and Crane Division • Lima, Ohio, U. S. A.

THE LIMA DIAMOND

FOR OVER 75 YEARS AN EMBLEM



OF QUALITY WORKMANSHIP

Capacities . . .

SHOVELS

¾ YARD TO 5½ YARDS

CRANES

13 TONS TO 100 TONS

DRAGLINES

VARIABLE



An Olson bottom-dump trailer is filled with crushed rock from a stockpile. The load rests entirely on the doors, which expose the entire bottom when they are opened. They are controlled from the driver's seat.

Bottom-Dump Trailers Carry 18 to 40 Yards

Bottom-dump trailers ranging in capacity from 18 to 40 yards are made by the Olson Mfg. Co., Boise, Idaho. They are designed for stockpiling or spreading crushed rock, or bulk hauling of earth, rock, and similar materials.

The sides of the trailer are vertical, the entire load resting on the bottom doors. Dumping is accomplished by a cable-controlled and hydraulically operated device from the driver's seat. A mechanical air-operated pin locks the doors and prevents accidental dropping due to mechanical or hydraulic failure. The doors are equipped with flexible hinges which are said to compensate for flexing of the body; by keeping the doors tightly closed they prevent sand or earth from leaking out.

The Olson bottom-dump trailer is spring-suspended and is mounted on either single or tandem axles, depending on the purpose for which it is to be used. The trailers are made to order to meet specifications or size.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 37.

Wax for Snow Plows

A new wax has been developed to overcome a problem of snow-removal work—the accumulation of snow on the plow and wing surfaces. Made by the Pennsylvania Refining Co., 2686 Lisbon Road, Cleveland 4, Ohio, this wax is said to form a hard, slick surface on the moldboards and wings. It can also be used on the knives and hoppers of rotary plows.

Penn Drake snow-plow wax is applied with an ordinary paintbrush. A double coat is recommended by the manufacturer for the original application. According to the company, a gallon will cover approximately 300 square feet of surface. It is packaged in 1 and 2-gallon cans, 5-gallon pails, and all sizes of drums.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 32.

Drills for Contractors

Catalogs describing the Cyclone line of earth drills for use by contractors are available from The Sanderson-Cyclone Drill Co., Orrville, Ohio. Catalog B deals with the No. 1000 series of all-steel wire-line air-speed spudder drills for drilling large blast holes. Catalog T deals with Cyclone drilling tools, Superloy all-steel bits, etc. Catalog W deals with the No. 42 series of all-steel wire-line air-speed spudder and water-well drills.

The catalogs describe the features of the Sanderson-Cyclone factory methods, and of the construction and performance of the equipment. Photographs show the drills installed and in use. The catalogs also give complete specifications and sizes for each unit in

the line.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 76.

Accident-Prevention Program Is Enlarged

Plans for enlarging its accident-prevention program were discussed at the spring meeting of the Associated General Contractors of America. It was agreed that this program should be directed towards supplementing, rather than taking the place of, the work now being done by the National Safety Council and the various insurance companies throughout the country.

The purpose of the current phase of the AGC program was set forth as an effort to familiarize AGC members and chapter officers with the material available which will be helpful in their local activities in accident prevention. The various steps in the plan are:

1. Survey insurance companies to compile a list of experienced construction-safety engineers in their employ.
2. Provide liaison between these insurance-company engineers and AGC members and chapters.
3. Continue gathering material for

use in revision of AGC "Manual of Accident Prevention in Construction", particularly illustrative material such as photos, diagrams, etc.

4. Indicate sources of appropriate film material available to AGC chapters.

5. A "Gallup" poll of AGC members to determine their attitude towards accident prevention.

(a) What sort of activities the AGC should conduct.

(b) What sort of service they desire therefrom.

Asphalt Men Name Two

Wallace D. Craig has been elected a Vice President and member of the Executive Committee of The Asphalt Institute of New York. He will head the Management Committee of Division I which comprises the Atlantic-Gulf territory.

Herbert Spencer has been named the Institute's District Engineer for New York and New Jersey. He will continue as Secretary of the Institute.

STANDARD ENGINEERS NOTEBOOK

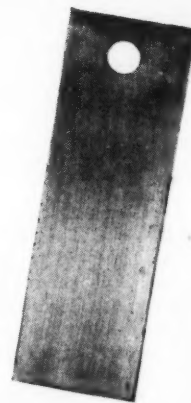
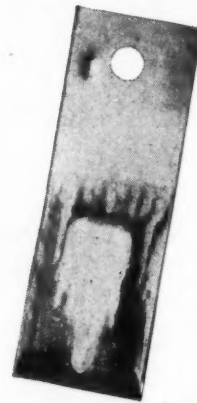
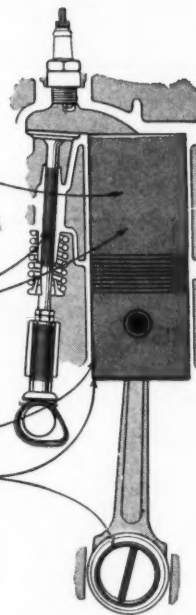


① Adhering agent in RPM Compounded Motor Oil keeps oil film on all parts after engine stops, even on cylinder walls.

② Rustproofing compounds prevent moisture that condenses on cooling parts from contacting metal.

③ No rust is formed to scrape off when engine starts, and cause excessive wear.

④ Constant lubricant film provides adequate and instant lubrication when engine starts.



This actual photograph shows how one HIGH-QUALITY MOTOR OIL "peeled" off almost all of this test strip of steel when it was placed in corrosive-moisture conditions similar to those in a cooling engine. The oil concentrated at one spot and the unprotected surface quickly rusted.

RPM COMPOUNDED MOTOR OIL kept this strip bright and shiny, completely sealed against rusting, when it was exposed to the same conditions. "RPM" compounds keep a constant rust-proofing lubricant film on engine parts at all times, whether they are idle or moving.

How RPM Motor Oil Rust-Proofs As It Lubricates

Rusting, caused by corrosive moisture, is the greatest source of wear in automotive engines (85%, according to some engineers). It can be controlled by using RPM Compounded Motor Oil.

Additional compounding for "RPM," perfected by Standard of California scientists, provides a rust-proofing lubricant film on internal engine surfaces. The heaviest moisture condensation in idle or cold-running engines will not cut through it.

Other compounds in RPM Motor Oil give it adherent qualities so the film stays on parts at all times. They also loosen and remove gum and lacquer, lubricate hot spots, resist sludge formation, bearing corrosion and stop foaming.

Trademark "RPM" Reg. U. S. Pat. Off.

For additional information and the name of your nearest Distributor, write Standard of California, 225 Bush Street, San Francisco 20, Calif.; The California Oil Company, 30 Rockefeller Plaza, New York 20, N. Y.; The California Company, 17th and Stout Streets, Denver 1, Colo.; Standard Oil Company of Texas, El Paso, Texas.

FOR EVERY NEED A STANDARD OF CALIFORNIA JOB-PROVED PRODUCT

The Highway Doctor

Highway Maintenance Men Are Future Big Businessmen in an Industry That Amounts to \$750,000,000 a Year

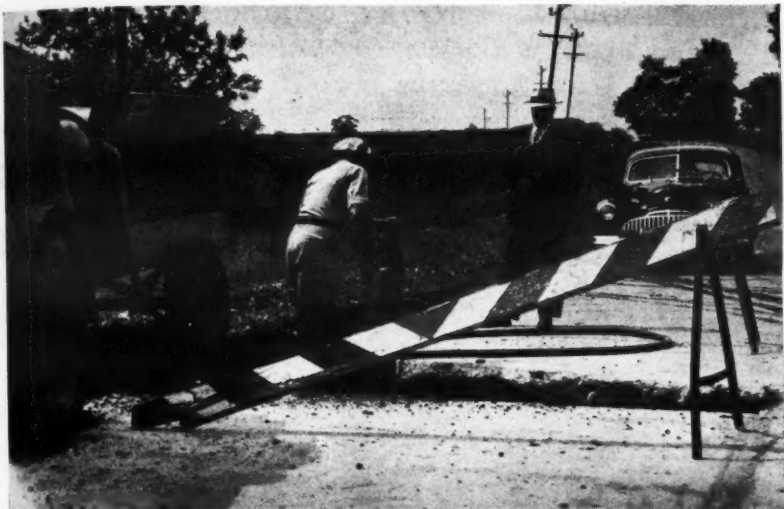
By RAYMOND P. DAY,
Western Editor

Photos by C. & E. Monthly and Missouri State Highway Department



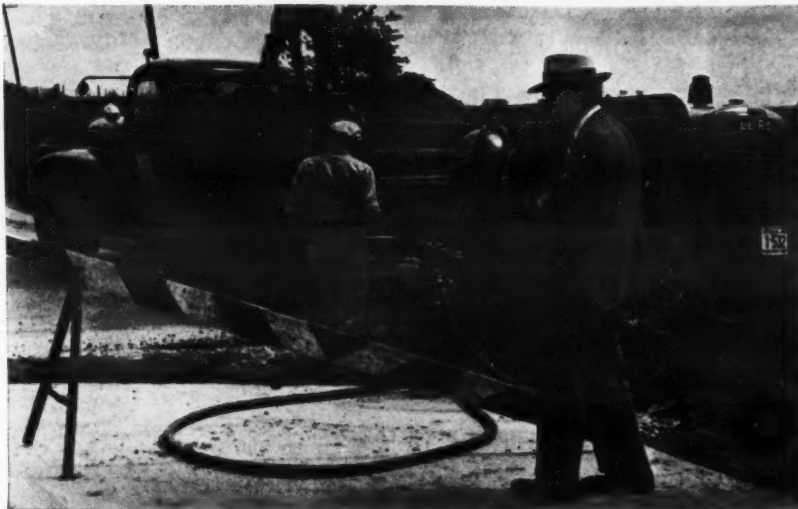
AT THE OFFICE.

Conferences, reports, supervision keep Rex M. Whitton, Missouri's Maintenance Engineer, tied to his office in Jefferson City Monday and Saturday of each week—sometimes longer. Here, at left, he confers with Missouri's Chief Engineer Carl W. Brown.



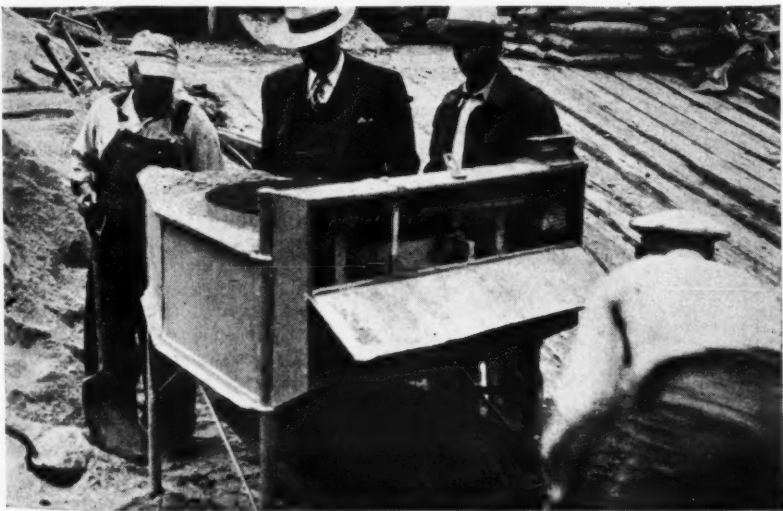
ON THE ROAD.

Twice a year Whitton and his Buick see Missouri's entire road system. He stops here at a concrete-pavement patching job to see the condition of subgrade, concrete, and drainage.



ROCK BLANKET.

He approves of the well graded crushed-rock blanket 2½ inches thick which is being laid under this patch. Full grading on rock prevents fines or mud from seeping up through the blanket.



CONCRETE PATCH.

He watches workers weigh ingredients of the concrete patch as carefully as did the original contractor. "Never put in maintenance material inferior to the original construction" is his rule.



MUD-JACKING.

"Smooth roadways come first", he explains to this foreman, whose crew raises a sagging concrete slab by forcing under it a slurry of four sacks of cement per cubic yard with half soil and half water.



ALL IN FUN.

The Mud-Jacking workmen good-naturedly tried to splatter mud on well dressed visitors whom they like. But they fail to touch maintenance-wise Whitton who steps back in plenty of time.

AN \$8,000,000 annual business, 2,500 employees, and 16,000 miles of state highways are currently reasons for graying hair for Rex M. Whitton, genial Maintenance Engineer of Missouri, who defines maintenance as "a smooth roadway, a clear waterway, a clean right-of-way"—in that order.

Whitton, persuaded that his experience might benefit others, finally held still long enough for these pictures. They show how to make a tough job interesting. "We've found no way to make it easy", says Whitton.

"The only permanent thing about a highway is its maintenance." Cynical words, perhaps, but so say maintenance engineers everywhere. Designers and construction engineers admit it. Highway maintenance—once looked on as the illegitimate offspring of design-construction parentage—is now "Mr. Big" around any highway department. It is a staggering \$750,-

000,000 industry a year, and growing.

The middle-western state of Missouri has a sizable part of that industry, with Whitton at its head. His name is well known wherever maintenance men meet.

Capable, well liked by associates and subordinates, Whitton's problems are as numerous as his friends. Part of his 16,471-mile state highway system is new enough to bear watching. All of it is so important that not one mile can be neglected.

Concrete Roads

Missouri has been for many years a concrete state, though it is now "upper-decking" worn highways with hot-mix bituminous topping to give them longer life. Maintenance costs for concrete highways are lower than bituminous roads for about 20 years, then they jump. Based on the average (Continued on next page)



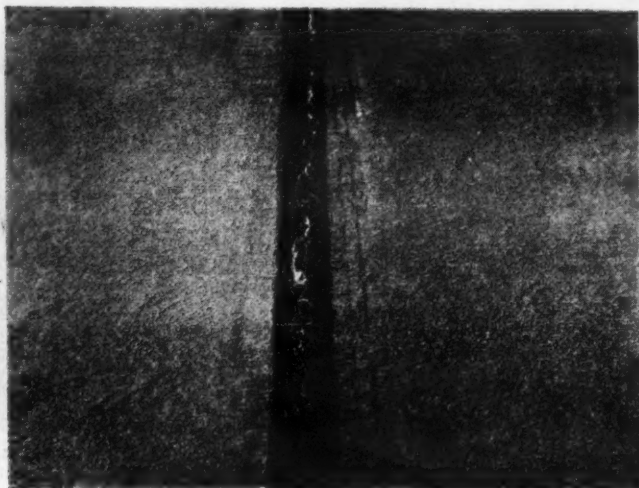
YESTERDAY, DIRT.

When Whitton joined the Missouri Highway Department 27 years ago, many state roads looked like this. Before heading the Bureau of Maintenance, formed in 1923 with the first concrete pavements, he came up through the ranks from rodman to division engineer.



TODAY, CONCRETE.

Today much of Missouri's 25,000 vehicles a day slide on a new two-lane concrete slab is just another road.



JOINT PUMPING.

A Whitton-trained foreman would mark down for immediate attention this spalling on a center crack (above, left), certain forerunner of joint pumping. For in its next stage of deterioration it will look something like this (above, right). By no means does Whitton look on maintenance just as emergency repair, though that notion still persists in the public mind, as well as in some official quarters. To him, repair of a slab is as much an emergency as mopping the kitchen floor is to the housewife.

Strangely enough, the notion persists in the public mind—as well as in some official quarters—the maintenance is strictly an emergency measure. Well, repair of a concrete slab is as much an emergency as mopping the kitchen floor is to the housewife.

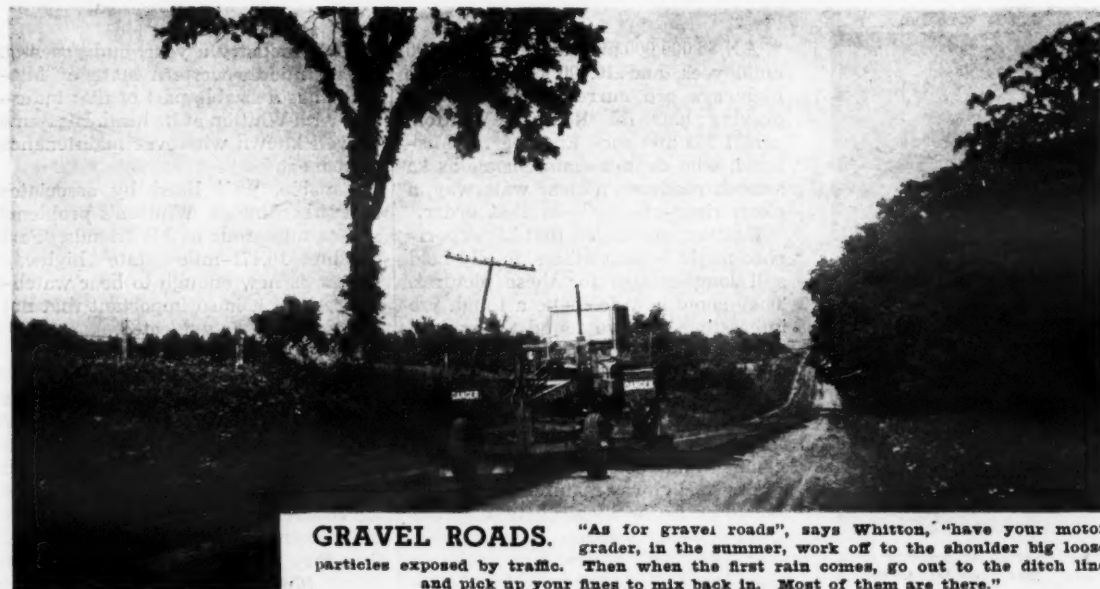
Just as dust collects and destroys in a house, destructive processes are constantly at work on a highway system, in almost direct proportion to the vehicle count. Whitton knows that maintenance is much more than a measure pushed during World War II until construction could be resumed. He knows that maintenance is an industry here to stay.

Gravel Roads

Missouri's gravel roads are all planned for armor topping. Their maintenance costs averaged \$330 a mile a year, including gravel replacement. "The whole secret of maintaining

ASPHALT JACKING.

Another aid to keeping concrete roads in service for years beyond their normal life is asphalt jacking. This outfit pumps hot bitumen under an old concrete slab resurfaced with hot-mix.



GRAVEL ROADS.

"As for gravel roads", says Whitton, "have your motor grader, in the summer, work off to the shoulder big loose particles exposed by traffic. Then when the first rain comes, go out to the ditch line and pick up your fines to mix back in. Most of them are there."



WATERWAYS.

A smooth roadway comes first. This matted growth away will the ditch at the left. This picture, taken in late autumn, fles the preventive maintenance characteristic

The Highway

(Continued from preceding page)

for all ages, maintenance costs \$400 mile per year for medium-travel concrete roads (under 1,000 vehicles per day), \$650 for heavy travel (1,000 to 2,000 vehicles), and \$800 for dual-lane highways.

Whitton has based his progressive system for maintaining concrete highways on the realistic theory that they are at their best the day they go in. Maintenance includes asphalt crack filling, asphalt undersealing, Mortar Jacking with a cement slurry, patching broken sections, and retopping with hot-mix by contract.

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Gravel Roads

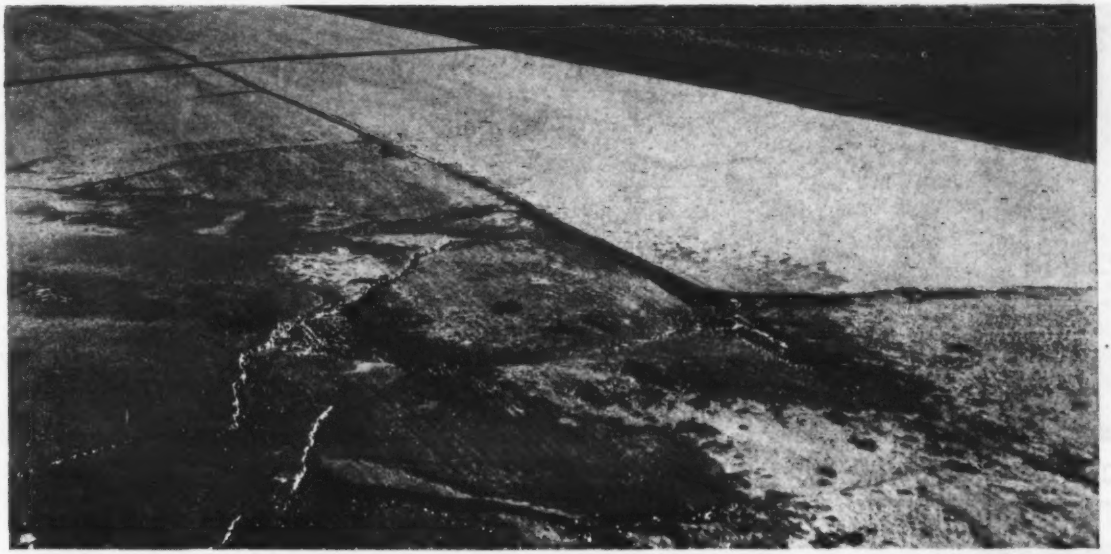
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WATERWAYS.

A smooth roadway comes first. This matted growth away will the ditch at the left. This picture, taken in late autumn, fles the preventive maintenance characteristic



Missouri's 77-mile system is new and modern with traffic counts up to 10,000 a day. There is no respect of modernity. This snow-soaked spring Whitton.



AGE, WEAR. Nor is modernity immune to age and traffic wear. Whitton has set up a maintenance system for concrete highways which includes asphalt crack filling, asphalt undersealing, Mud-Jacking with cement slurry, patching broken sections, and retopping with hot-mix asphaltic concrete by contract.

Highway Doctor

good gravel surface", says Whitton, "is to keep on replenishing the fine binder particles that wash away in rainstorms or blow away as dust. All summer your motor grader will have to work the big loose particles off to the shoulder as traffic exposes them. Then, when the first rain comes along, you just go out to the ditch line and pick up your fines to mix back in. Most of them are there", he adds, smiling.

Advanced gravel roads like Missouri 89, leading from Belle to Chamois, are polished for months; tacked with 0.5 gallon of SC-1 per square yard; armored with MC-5 and rolled surface chips. Hundreds of miles of this higher-type surface are being built.

Mistakes Put to Work

Whitton is his own most critical judge as he inspects Missouri's entire road system twice a year. Practical, realistic, he never kids himself that a road is good when he knows otherwise.

Studying a pavement failure as he makes his rounds in his Buick, he forms an opinion as to its cause. In cooperation with Construction Engineer J. J. "Jim" Corbett and other Maintenance Bureau heads, he passes his experience along to Design and Construction. Better analysis and correction of past mistakes, Whitton believes, is tremendously important to the future. His opinion carries weight, for he has a good background of construction and design. He joined the Missouri Highway Department 27

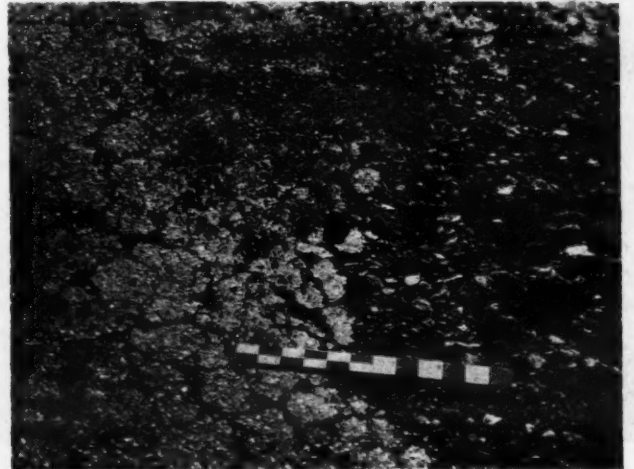
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CRACK FILLING. In the winter, when joints open up in concrete pavements, Whitton's crews get busy with hot asphalt. Each works under a division maintenance engineer at St. Joseph, Macon, Hannibal, Kansas City, Jefferson City, Kirkwood, Joplin, Springfield, Willow Springs, and Sikeston.



HOT-MIX TOPPING. For a long time a concrete state, Missouri is now adding life to worn highways by "upper-decking" with hot-mix bituminous topping.



LOW-COST ROADS. This initially low-cost road, whose bituminous armor coat has been broken up by heavy traffic, will be rebuilt better than the original.



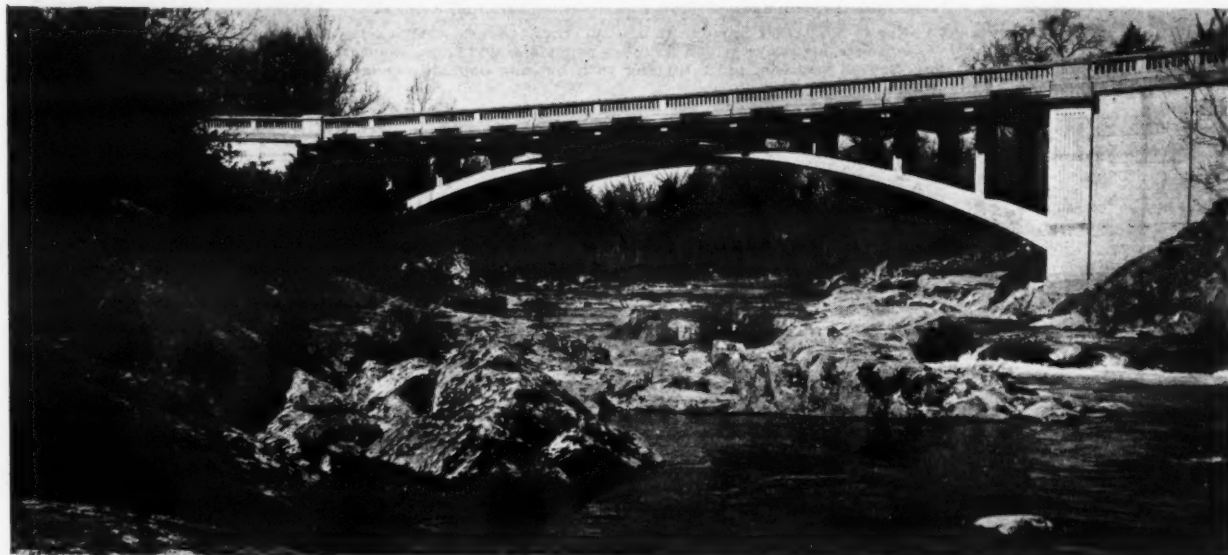
RIGHT-OF-WAYS. As for right-of-ways, Whitton schedules complete clean-ups for Memorial Day and September 15, mowing in between as needed. He favors low-growing grasses to prevent erosion and make "a Missouri road look like it's in Missouri." He's not averse to the occasional right-of-way tree. "But when you plant something along a highway which you have to spray and prune, you're wasting your money," he says.



CUTTING COSTS. Whitton's Bureau is highly mechanized to hold costs down. Here a new Athey Force-Feed Loader picks up excess earth from a maintenance-built drainage ditch for less than 3 cents per cubic yard.



SNOW REMOVAL. The best public reaction to the Bureau's activities comes from snow removal. Snow fences like this may stand all summer on pasture land; they are removed from cultivated land, rolled, and stacked.



FLOODS. His worst nightmares are floods. In 1943 the Missouri River (see above) cut through a state highway west of Glasgow, digging a 56-foot-deep hole. In 1947 it repeated the performance; required 100,000 cubic yards of fill. Whitton's other gray hairs came early in life. With characteristic disregard of protocol he invaded a peach orchard one day when he was a young rodman—and hungry. He couldn't understand how the irate farmer traced him to the highway office, until the man pulled out a surveyor's notebook from his pocket lettered beautifully "Rex M. Whitton, Missouri Highway Department."

WATER. It's too bad, but there just isn't a preventive formula to fit every maintenance problem. Here, the hard way (see left), Whitton has evidence that water seeks its own level—another headache for the maintenance man.



ALL OF MISSOURI. Far down in the Ozarks of Iron County, this secondary state highway passes by Lake Killarney. "Keep all of Missouri accessible to her motorists" is a goal Whitton and the Department have achieved.

The Highway Doctor

(Continued from preceding page)
years ago, and came up through the ranks.

Integration, Initiative

Each of the division maintenance engineers accompanies Whitton on his trips through their divisions. And by means of frequent conferences in Jefferson City with all these engineers, Whitton keeps his far-flung outfit integrated, its schedules tight-knit and well organized. Division engineers, too, sit in on these meetings.

He also encourages personal initiative. If one division gets results with SC-3 equal to MC-3 in another part of the state, he will not insist that the individual standardize.

Employees frequently prove to themselves and to Whitton that something is an improvement. He is quick to adopt such new techniques. Persuasively he carries them all over the state, giving the individual full credit in the official highway department newspaper "Missouri Highway News".

Employee Relations

More than half his crew know Whitton by name. He knows hundreds of them. With the ease of the competent man, he chats with them for a few minutes at every stop. But he never gives orders directly to them. He leaves that to the division maintenance engineers who accompany him.

He is a popular general—"a good engineer and a gentleman with it", his men say behind his back. Perhaps the greatest single cause of this unusual employee loyalty is Whitton's own attitude towards living. He has never spoken to any man except as an equal.



A GOOD ENGINEER. "Whitton's a good engineer and a gentleman with it", say his men behind his back. Large cause of this unusual employee loyalty is Whitton's own attitude towards life. He has never spoken to any man except as his equal.

How Do You Lubricate Your Air Compressor?

Proper Engine Lubrication Is Essential to Continuous Reliable Service; Here Are Some Suggestions

Part II

THE modern portable air compressor is driven by either a gasoline or an oil engine. The four-cycle principle predominates. Some designs are convertible from one fuel to the other by making simple substitution of fuel accessories.

The May issue of *Lubrication*, published by the Texas Co., set forth the proper procedure for lubricating portable air compressors. These recommendations by A. F. Brewer and K. L. Hollister of the company's Technical and Research Division were passed along to our readers in an article on page 37 of the August issue of *CONTRACTORS AND ENGINEERS MONTHLY*. In this article we present the remaining portion of these recommendations covering the proper lubrication of portable-compressor engines.

Gasoline Power

Simplicity of design and ready access to all parts have been accepted as fundamental requirements by the builder's of the gasoline engine for portable-compressor service. Particular attention has been given to including completely automatic lubrication, to do away with all complications and assure positive distribution of oil to the various parts.

Lubricating oil for a gasoline engine should be selected strictly on two bases: (1) quality, which involves chemical characteristics, to insure proper refining for removal of impurities; and (2) viscosity, to insure the proper grade.

Excessive friction may result from the use of an oil which is either too high or too low in viscosity. Too high a viscosity will give a good film, but the internal friction in the oil may be excessive; conversely, if the viscosity is too low the film may be too thin, allowing excessive wear. The physical characteristic viscosity, therefore, is important in selecting a motor oil; it is a measure of the ability of the oil to maintain the proper film under the existing conditions of speed, pressure, and temperature.

Protecting Lubrication

Oil filters and air filters are advantageous in reducing engine wear, for they keep road dust out of the air and fine abrasives out of the oil. Pressure circulation is also advantageous. It provides flood lubrication for the bearings to insure that they will be not only washed free from accumulations of foreign matter, but also cooled to a certain extent. Lubrication is further protected by using a motor oil which is fortified with materials to retard oxidation and give added stability to the oil film.

Oil-Gage Pressure

The oil gage indicates that engine lubrication is being maintained. It does not, however, indicate the amount of oil being circulated.

Oil-gage pressure and rate of circulation vary according to the viscosity or relative fluidity of the oil. Oil-pressure drop frequently causes worry to some operators. However, it is an indication of impaired lubrication only when pressure is lost entirely, for this may mean a broken or inoperative pump.

With the natural reduction in oil viscosity which accompanies normal

engine operation, resistance to pumping will be proportionately reduced and flow rate increased. A certain amount of drop in pressure, especially during full-load or warm-weather operation, should, therefore, be expected.

In other words, the lighter the oil, the more easily it will pump and circulate; this requires less pressure. Reduction in body or viscosity may result from heating or dilution. If the oil pressure drops very low, it may indicate that the viscosity of the oil is too low for the operating temperatures involved. Perhaps the oil was too light in the beginning or there has been excessive dilution.

To correct this, check back on the grade of oil used and run with as lean a fuel mixture as practicable. Reduced

choking, the least amount of idling, and bringing an engine up to operating temperature as soon as possible after starting will all help reduce dilution.

High or rising gage pressure during operation should be of far more concern. For it may be an indication of faulty lubrication due to clogged oil lines, or an oil that is too sluggish and heavy to pump readily and distribute freely to the bearings, or splash to the cylinder walls, according to the type of lubricating system involved.

Carbon Deposits

Just how an excess of lubricating oil may cause abnormal carbon deposits is of interest. Theoretically, a very small amount of oil is necessary to maintain the requisite lubricating film on the cylinder walls and serve the respective bearings; actually, however, a considerable excess of oil will be used. Where the piston rings give the proper degree of seal and the cylinder walls are not abnormally worn, very little oil should pass into the combustion chamber. If



"Where'd you say you painted that?"

the oil level is carried too high, however, the amount of oil on the cylinder walls may be so excessive that some cannot help being pumped into the

(Continued on next page)



We were behind the 8-ball until...

We were going crazy on this big housing project. An old building had been razed, and it was our job to get the debris out of there but *fast!* Hard as we worked, we just couldn't seem to stay on schedule.

I'd probably be a gibbering idiot if our Oliver "Cletrac" dealer hadn't happened to drive out. "Why not put a Sargent OVERHEAD on that Cletrac of yours?" he grinned. "Then you can back up to that mess, get a load, and pull straight up to your truck, without turning, and dump the load. You'll save enough time to catch up to schedule. I've got an OVERHEAD in my place now. Send in your tractor, and my boys will mount it tonight."

Well to cut the story short, that's just what I did, and we not only caught up to schedule, we beat it! That quick service certainly got us out from behind the eight-ball. The Oliver "Cletrac" dealer is a good guy to know.

Cletrac
a product of

The OLIVER Corporation



"THE SIGN OF EXTRA SERVICE"

How Do You Lubricate Your Air Compressor?

(Continued from preceding page)

combustion chamber. A smoky exhaust may indicate oil pumping.

Carbon in the combined form in petroleum products is not harmful. It is only a detriment when it is in the form of soot (from incomplete combustion), or deposits of carbonaceous tarry matter (from oxidation of the crankcase oil). This may, of course, have a very decided effect upon the operation of the engine, the amount of power developed, and the amount of "knocking"; the effect will vary according to the extent to which carbon deposits are formed on the spark plugs, pistons, cylinder heads, around the rings, on valves and valve seats, and in the crankcase.

The amount of ultimate carbonaceous residues and their nature depend entirely upon the degree of heat present, the extent of refinement of the lubricant, the base of the crude, and the effectiveness of the additive in keeping the engine clean through the use of a heavy-duty oil.

Diesel or Oil-Engine Lubrication

The diesel or oil engine gives the operator of a portable air compressor an interesting alternative to the gasoline engine.

Oil engines are economical and suitable where starting is accomplished under normal temperatures. If a machine must start at extremely low temperatures, the gasoline engine is preferable.

The term "diesel or oil engine" as generally used is applied to internal-combustion engines that burn heavy liquid fuels. The distinguishing features of these engines are that the fuel vapor is not mixed with air before it is admitted to the cylinder, and no inflammable mixture of vapor and air is compressed preceding ignition.

Diesel engines compress air alone. The heat of compression is used to ignite the atomized liquid fuel which burns by consuming the oxygen of the air in the cylinder; the engine transforms the heat energy into work. To facilitate and accelerate the burning of a liquid fuel, it must be vaporized and intimately mixed with air immediately preceding its ignition. Both the diesel and oil engines, as designed for portable-compressor service, are capable of burning practically any grade of liquid fuel from kerosene upward.

Lubrication Must Be Positive

The severe service conditions which prevail in the lubricating system of any such engine require an oil of maximum stability. Inferior or unsuitable lubricating oils can cause gummy deposits which are not detected until they have formed to excess. Meanwhile, the oil may still appear to be in fairly good physical condition.

Gummy deposits are most dangerous when they lodge within the oil pipes leading to the bearings, or the oil ducts within the crankshaft or the connecting rods. The accumulation of such deposits may not be observed until sudden restriction or stoppage of oil to some bearing or group of bearings occurs, with resultant burned-out bearings and the necessity for costly repairs.

Power-Cylinder Lubrication

Efficient lubrication of the power cylinders requires that an oil film be maintained continually on the cylinder walls to afford adequate protection regardless of the grade of fuel, the completeness of combustion, the piston-ring pressure, and the operating temperature. Successful engine-cylinder lubrication is dependent on three fac-

tors:

1. The use of properly refined oil.
2. Application of sufficient, though never excessive, amounts.
3. And delivery through oil-ways so located that the piston and rings and bearings will receive an ample supply.

To secure the most effective lubrication of engine cylinders, the oil should be delivered continually to the cylinders and pistons by some form of automatic lubrication, which insures a charge of sufficient volume to cover the entire cylinder wall under the swabbing action of the piston.

Oil-Film Seal Important

The high-pressure gases above the pistons of any such engine are prevented from leaking between the piston and cylinder walls by properly fitted rings together with a suitable sealing medium in the form of a lubricating film. Although the metal surfaces of cylinders, pistons, and rings are carefully finished and accurately fitted, leakage of gases cannot be prevented unless the small clearances between the wall and rings are sealed effectively by the lubricant.

The lubricating-oil film must be maintained under two concurrent conditions of operation—high temperature and high pressure. The higher the temperature of the products of combustion, the hotter will be the adjacent parts; and there will be a consequent reduction in the body of the oil film separating the metal surfaces. The greater the gas pressure, the more difficult it is to maintain a lubricating film between the rubbing surfaces. Proper functioning of the upper piston rings is particularly important under these conditions.

The highest pressure is found behind the uppermost ring and is nearly as great as that on the piston head itself; it decreases gradually behind each succeeding ring until it is practically negligible behind the lowest ring. These pressures along with the natural spring of the rings will force them against the cylinder wall; this will produce a squeezing action which the lubricating oil must support.

Effect of Temperature, Pressure

The high temperature of combustion in an engine cylinder occurs simultaneously with the high pressure. This combined action, especially under adverse conditions, will be very detri-

mental to the oil film. If it is inadequate, it will thin down to cause loss of compression and excessive cylinder-liner wear. This inevitably results in increased cost of power and upkeep.

Under such conditions of high pressure and temperature, the lubricant must be able to spread rapidly on the cylinder walls and to replenish its own

lubricating film. It must have film strength even when exposed to high combustion temperatures as well as the pressures to which it is subjected through the piston rings. And it must maintain a complete piston seal effectively under all conditions.

Cylinder-liner wear is generally (Continued on next page)

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How Do You Lubricate Your Air Compressor?

(Continued from preceding page)

greatest at the combustion end of the cylinder, in the vicinity of the upper piston ring, where maximum temperatures and pressures exist. The wear decreases along the cylinder walls in proportion to the lower temperatures and pressures encountered during the power stroke.

Bearing Wear

Excessive bearing wear may be as serious as excessive cylinder wear. It is impossible for metal surfaces under pressure, such as journals and bearings, to move in actual contact even for short periods of time without generating heat. This will quickly become excessive. And eventually it will injure the materials unless the surfaces are positively separated by a film of oil which lubricates as well as cools the bearings.

While extreme cylinder wear leads to loss in compression and consequent loss of power, excessive wear of main bearings causes loss of power and may also lead to fracture of the crankshaft. In the four-cycle engine, comparatively slight wear may be indicated by pounding, especially if this wear has occurred in the wrist-pin bearings.

Amount of Lubrication Required

The quantity of oil which should be circulated through a bearing lubricating system varies widely, according to engine design and the means of lubrication. It depends largely upon the size and speed of the unit as well as the design of the lubricating system. The chief requirement is that the amount of oil circulated shall be considerably in excess of what is actually necessary for lubrication; this will enable the volume of oil flowing through the bearings to serve as a cooling medium in addition to maintaining a film between the bearing surfaces. Properly refined oils of suitable viscosity (according to the operating conditions) carry the prevailing pressures, and they also cool effectively.

Selection of Lubricating Oil

The engine manufacturer will usually designate the type and grade of oil to be used in his engine. Best performance results from the use of high-quality oils in which additives are used to impart properties which give a clean powerful engine requiring a minimum of maintenance. A brief description of such oil properties follows.

Detergent-Type Engine Oils

The heavy-duty detergent-type oil is well suited for either gasoline or diesel-engine lubrication. The dictionary defines the action of detergency as the cleansing or purging away of foul or offending matter. This is exactly what the chemical compound added to the straight-mineral-base oil does to prevent the piston rings from sticking in their grooves. In new or clean engines, the initial deposition of products of fuel combustion and oil decomposition is prevented. In used engines, detergency exerts a cleansing or dissolving action on old previously formed deposits, preventing their redeposition.

During combustion, fuel deposits are formed which consist of gummy residues and soot. In addition, decomposition of the lubricating oil reaching the rings is also influenced. These gummy residues act as binders for the fuel soot and build up sticky deposits on the ring lands and in the ring grooves.

The additive in the lubricating oil enables the oil reaching these engine parts to take up the deposits. This is accomplished partially by dissolving them but mostly by dispersing them in

a finely divided state. This washing action of the lubricating oil in these potential deposit-forming bodies from fuel combustion is exerted as soon as the particles reach the oil. This same action occurs in other parts of the engine reached by combustion-chamber products when blow-by occurs past the piston rings. These deposit-forming materials are partly dissolved and partly dispersed in suspended state throughout the lubricating oil; thus they can be carried out of the engine when the oil is drained and the engine is kept clean by this detergent action of the lubricating oil.

Another characteristic of detergency in engine lubricating oils is the ability to remove previously formed deposits from the surfaces of engine parts. This action is likened to that exerted by soap and water in cleansing dirty surfaces. These removed deposits are then broken up and dispersed in a finely divided state throughout the body of the oil for removal from the engine at the oil-drain period.

Oxidation Resistance

As improvements in engine design permitted the development of more power for the same size and weight, new materials were necessary to withstand the higher stresses imposed. Chief among these was the copper-lead bearing which could stand heavier loads and higher temperatures than the ordinary babbitt bearing. This bearing

was rapidly adopted for heavy-duty service in both gasoline and diesel engines.

But it was discovered that under severer operating conditions, ordinary motor oils were corrosive to this copper-lead mixture. The corrosiveness was brought about by the inability of this type of oil to resist oxidation, which

(Concluded on next page)

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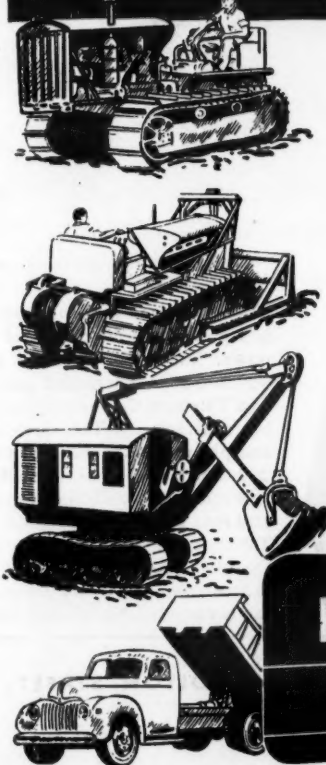
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HOMESTEAD VALVE MANUFACTURING CO.



P. O. BOX 30 CORAOPOLIS, PA.

How Do You Lubricate Your Air Compressor?

(Continued from preceding page)

results primarily from the action of heat and atmosphere. The resultant acidic bodies formed by this oxidation process attacked the lead in the copper-lead mixture. They took it into solution and left a porous copper structure which crumbled and broke away. Thus it became necessary to impart oxidation-resisting properties to the oil.

Improvement in oxidation resistance of the straight-mineral-type engine oil, as determined by corrosiveness to the alloy-type bearing, was attained by the use of chemical compounds or additives. These compounds were designated as oxidation inhibitors or corrosion inhibitors.

The corrosion inhibitors primarily afford a protection to the alloy-type bearing so as to minimize the effect of acidic bodies on these bearings. The oxidation inhibitors provide protection to this type of bearing by combating the formation of acidic bodies; this also results in a minimizing of varnish and lacquer deposits on piston skirts.

Dispersion

During this development of oxidation-resistant heavy-duty engine oils, dispersion was also improved.

Dispersion in a lubricating oil is a physical reaction, in that the products of fuel combustion, chiefly soot, along with some oil-decomposition products are held in suspension. This appears to be accomplished by the dispersing of these contaminating particles in a finely divided state throughout the body of the oil. By this action, agglomeration of the particles is prevented; oil filters do not clog and strainers stay clean.

Although the phenomenon of detergency employs dispersion to a large extent, the two properties should be considered separately. This is clear when one considers that while all detergent oils known today have good dispersive properties, not all oils with high dispersion values display satisfactory detergency.

Proper Care Pays

Just as with all other equipment, careful selection and application of good-quality lubricants in the correct viscosity grades is the best insurance for low operating and maintenance costs. The wise operator will do well to avail himself of the benefits which result from the use of suitable additives in lubricants for both the compressor and the engine of portable air compressors.

Concrete-Materials Data

A series of compounds for treating and repairing concrete and concrete surfaces is prepared by the Concrete Materials Corp., 318-320 W. Hubbard St., Chicago 10, Ill. Instructions covering these materials and the directions for their use have been prepared and are obtainable from the company.

The Comco line consists of hardeners in both powder and liquid form, waterproofing compounds, and the Comco ready-mixed repair and resurfacing cement.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 85.

Tilting-Platform Trailer

Descriptive literature on its line of two-wheel tilting-platform trailers is available from the C. N. Monroe Mfg. Co., 2525 So. Dort Highway, Flint 7, Mich.

The Monroe trailer is made in four models: Model 40A, the standard;

Model 40B, the same as the 40A except that it has a wood instead of a steel platform; Model 40, the same as the 40A, only without platform or stake pockets; and the Model 20, with single instead of dual wheels. Capacities vary to 3 tons depending upon size of tires used.

The bulletin describes features of construction, the patented hitch, the leveling device, winch, platform, etc. A list of specifications for the Model 40A and optional equipment available is featured on the final page of the bulletin.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 80.

Calif. Steel Distributor

The opening of a Los Angeles plant has been announced by Joseph T. Ryerson & Son, Inc., of Chicago. Located at 4310 E. Bandini Blvd., the new plant will offer complete steel-servicing facilities and equipment.

High-Cycle Generator

Electric power for running high-cycle electric tools is furnished by generators made by the Homelite Corp., 71 Riverdale Ave., Port Chester, N. Y. Light in weight, they are recommended by the manufacturer for use with electric chain saws, drills, grinders, and similar equipment.

Homelite portable generators are

made in two models, Model 24A 230/180 and Model 25A 230/180. The 24A has a rated capacity of 2,500 watts, and weighs 129 pounds complete with its integral gasoline engine. The Model 25A has a rated capacity of 5,000 watts and weighs 171 pounds. Both models are 180-cycle generators.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 27.

THE BYERS SEEDER



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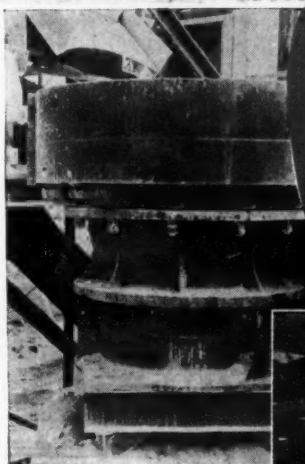
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It will sow grass seed, commercial fertilizer, limestone or any granular material that can be broadcast on the surface of the ground and raked in.

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Watauga Dam, near Elizabethtown and Johnson City, Tenn. on the Watauga River



Tel Smith 16-B Gyratory Breaker

...for TVA's
Watauga Dam
TELSMITH EQUIPMENT
will crush 400,000 tons!

Tel Smith 48" x 12" Heavy Duty Apron Feeder, and Tel Smith 36" x 42" Jaw Crusher

(Right) Tel Smith No. 36 Gyrasphere Secondary Crusher

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48" x 12" Heavy Duty Apron Feeder
30" x 42" Roller Bearing Jaw Crusher
16-B Gyratory Breaker
No. 36 Gyrasphere Secondary Crusher with fine crushing concave ring
40" x 22" Double Roll Crusher with special backgear case

● The Watauga Dam, now being built by the Tennessee Valley Authority, is a power and flood control project. A rock fill structure with concrete power house, spillway and power tunnel, the dam will require about 400,000 tons of crushed aggregate. The rock is a dense, hard dolomite, and Tel Smith Crushers of four different types are doing this big crushing job satisfactorily. The various amounts and sizes of aggregate required, and plant capacity are—100,000 tons of minus 12" coarse filter material, 200-250 tons per hr.—150,000 tons of minus 1 1/2" fine filter material, 150 tons per hr.—100,000 tons 3/4"-1 1/2" and 3/8"-3/4" concrete aggregate, 100 tons per hr., and 50,000 tons of minus 3/8" stone sand produced by Tel Smith No. 36 Gyrasphere Secondary Crusher and Tel Smith 40" x 22" Double Roll Crusher. Since Tel Smith Engineers build all types of crushers their recommendations are not biased. Consult them about your crushing plant now. No charge, no obligation. Get Bulletin E-34.

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Clyde Equipment Co., Portland 9, Ore., & Seattle 4, Wash. • Brandeis Machinery & Supply Co., Louisville 8, Ky. • Southern Ept. & Tractor Co., Monroe, La. • Rish Equipment Co., Charleston 22, & Clarksburg, W. Va.—Roanoke 7, & Richmond 10, Va. • Wilson-Weesner-Wilkinson Co., Knoxville 8, & Nashville 6, Tenn.



Motor graders such as this recently purchased Gallon Model 102 play a big role in the highway work of Weld County, Colo. With its 4,023 square miles, the county is one of the largest in the U. S., and 75 per cent of its 6,000 miles of roads are graveled. The grader is operated by an International DU-14 diesel power unit.

Legislatures Take Anti-Diversion Steps

Forward steps in the protection of highway-user funds have been taken by nine states, according to a survey by the National Highway Users Conference. The new laws reduce the amount of special highway-user taxes which can be used for other purposes, or eliminate diversion entirely.

Nebraska has ended the diversion of one cent of its gasoline tax to the Old Age Assistance Fund. Henceforth, this one-cent tax will be distributed to the counties for improvement of rural mail routes. Illinois has added a statute which prohibits entirely the diversion of highway funds for non-highway purposes.

The North Carolina General Assembly this year repealed the provision in its law which would have permitted diversion of highway funds to non-highway purposes in the event of a deficit in the general fund. This provision (in the state since 1935) has been opposed by highway-user organizations in that state.

In Wisconsin, a bill to segregate all highway funds has been passed by both Houses of the Legislature (the present law protects only \$36,000,000 annually for highway use). The Governor may veto the proposal, but there may be sufficient votes to over-ride when the Legislature returns for final adjournment in September.

Maryland's 2 per cent certificate-of-title tax now goes to the motor-vehicle fund rather than the general fund. Also, state-police costs for this state are now paid from the general fund rather than the motor-vehicle fund, as in the past.

New Mexico now limits diversion of registration fees to the general fund to 10 per cent instead of 15. Allowances to counties for school purposes decreased from 25 to 15 per cent. Massachusetts and Tennessee legislatures have approved anti-diversion amendments to the state constitutions for the second time, thus providing for popular vote at the next general elections. The Florida Legislature has passed an anti-diversion amendment applying to gasoline taxes, and it now goes to the people.

On the other hand, Rhode Island has just approved a gasoline-tax increase to 4 cents per gallon, with the entire amount to go to the general fund. Ohio now permits counties to use gasoline-

tax funds for construction and repair of sidewalks along county roads in congested areas. In Minnesota, court action has been instituted to bar as a diversion

a 1947 statute transferring \$314,000 from highway funds to the general fund for gasoline-tax collection costs.

Flame-Thrower Unit For Burning Weeds

A portable flame thrower has been announced by the Cedarberg Mfg. Co., Inc., Dept. L, 527 So. 4th St., Minneapolis 15, Minn. It is designed for use in killing weeds, thawing equipment or culverts, and other situations where a portable flame is required.

The No. 60 Cedarberg flame thrower burns kerosene, No. 1 range oil, tractor fuel, or other low-volatile fuels. Each unit has an external air pump with a positive-check valve and an air gage. It is said to produce heat up to 2,000 degrees F, and to operate up to 2½ hours on one gallon of fuel. It is 32½ inches in length and weighs 8½ pounds.

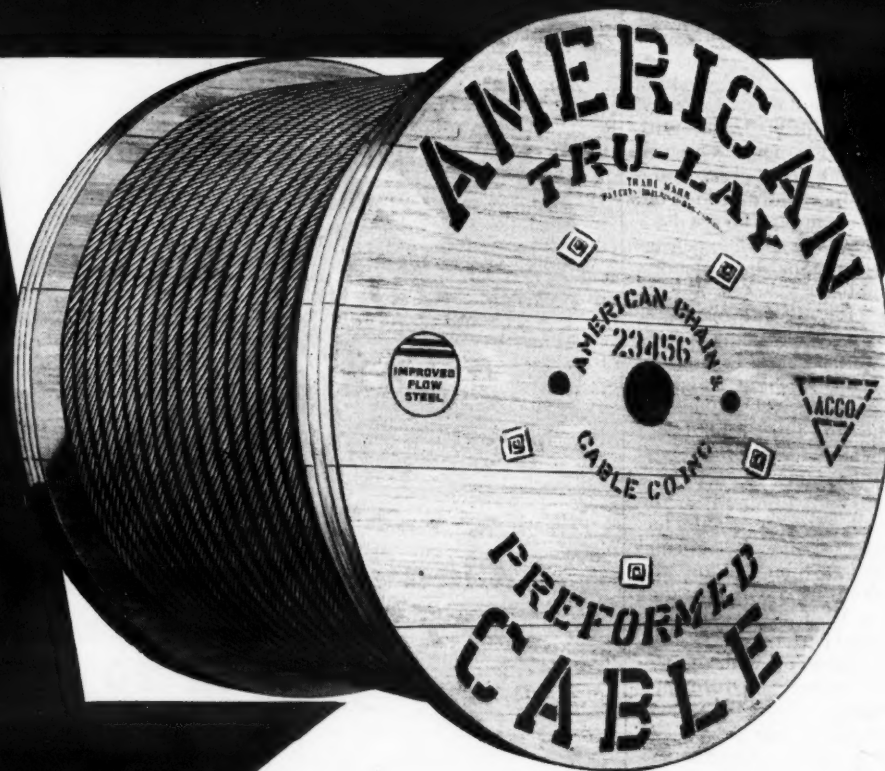
Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 19.

Blakeley Named Secretary For ARBA Affiliate in Miss.

The appointment of Col. Harry E. Blakeley as Executive Secretary has been announced by the Mississippi Highway Contractors' Association, an ARBA affiliate, at Jackson, Miss. Col. Blakeley has recently completed a six-month refresher course in organization work at the national headquarters of the ARBA in Washington, D. C. While there, he was Acting Managing Director of the ARBA contractors' division.

The new Executive Secretary of the Mississippi contractors is an alumnus of Georgia Tech in civil engineering, class of '28. He taught that subject for four years at the University of Tennessee. Later he was employed by the Tennessee Highway Department on location jobs, bridge work, and road-construction projects. He also superintended construction jobs in Kentucky and was for a time Field Engineer of the Penn-Dixie Cement Corp. He spent six years in the Army.

TRU-LAY Preformed

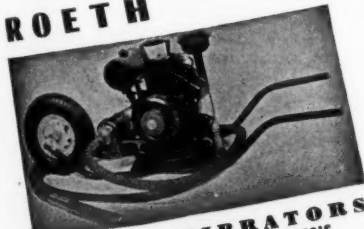


CLAMSHELL CLOSING LINES

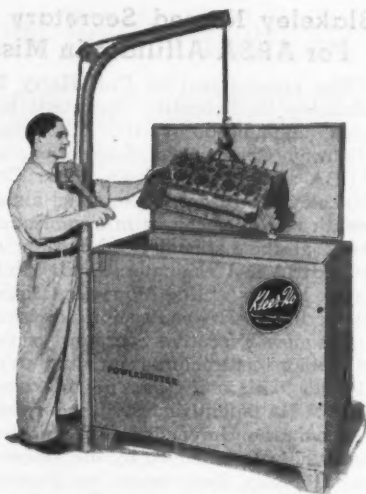
Operators are proud of what they can do with a clamshell bucket. They like TRU-LAY wire rope for their closing lines because it helps them do a better job. • You might call it "gilt-edge" wire rope... this TRU-LAY. It cuts clean without seizing. It takes the reverse bends and will run longer over small sheaves. When wires do break, they don't turn into barbs that will slice a fellow's hand right through his glove. These are the advantages gained by Preforming TRU-LAY. • Add to this the strength provided by the toughest of Improved Plow Steel wires and you get a rope that will stand the gaff. Ask for TRU-LAY Preformed Improved Plow Steel.

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The Kleeer-Flo Powermaster, a power-agitated degreaser, is designed to hot-wash an entire engine block in one operation using Kleeer-Flo Hi-T Greasoff cleaning compound.

Pressure Cleaning Of Engines and Parts

Equipment for the pressure cleaning and degreasing of automotive engines and parts is made by the Practical Products Co., 2632 Nicollet Ave., Minneapolis 8, Minn. The Kleeer-Flo Powermaster is a power-agitated degreaser for heavy-duty automotive and industrial cleaning. It is designed to hot-wash an entire engine block in one operation. The Kleeer-Flo Hydromaster is a portable unit for spray-gun washing of engines or chassis.

In the Powermaster, the washing pressure is created by the rapid vertical strokes of the motor-driven rack. With the use of Kleeer-Flo Hi-T Greasoff cleaning compound, the grease and grime are said to be rapidly flushed off. The Powermaster can also be used for cold-washing of small parts such as carburetors, fuel pumps, brake shoes, or clutch assemblies.

Specifications for the Powermaster include load capacity, 300 pounds; floor space required, 33 x 43 inches; up and down travel of the washing tray, 4½ inches; tank capacity, 80 gallons of solution; and heating time, 2 hours.

The Hydromaster features a combination refill and safety cap which is said to release pressure gradually as the cap is unscrewed. The spray gun has a volume adjuster, a rate-of-flow control handle, and a non-leaking tip. Cleaning compound used with this unit is the Kleeer-Flo Hi-T Mastersol. It is said to saturate and penetrate residue, making it easy to flush off with the Hi-Pressure air and water gun furnished with each machine.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 59.

Sales Shifts for Goodyear

Three shifts in its sales organization have been announced by the Mechanical Goods Division of the Goodyear Tire & Rubber Co. R. E. Pauley, District Manager at Pittsburgh, becomes Sales Manager of the company's molded-goods plant at St. Marys, Ohio. He is succeeded by Robert B. Warren, who has been eastern railroad Sales Manager for Goodyear in New York City. Howard T. Martin has been named District Manager of mechanical-goods sales at Dallas, Texas.

Diesel Tractors, Graders

How diesel power is helping to build the highways of tomorrow is the theme of a catalog issued by the Caterpillar Tractor Co., Peoria 8, Ill. Form No. 10232 contains 16 pages of active job scenes which show Caterpillar equipment being used in the present highway program.

The booklet describes track-type tractors equipped with scrapers for me-

dium hauls, pneumatic-tired tractors and wagons for long hauls, and track-type tractors and bulldozers for short hauls. It shows diesel motor graders used for haul-road maintenance, back-sloping, and fine finishing. It also points to diesel-engine installations in drag-lines, shovels, compressors, and crushing plants.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 91.

Bulletin on Vibrators

A descriptive bulletin telling about its concrete vibrators and related equipment has been issued by the Dreyer Vibrator Co., 509 E. 16th St., Los Angeles, Calif. It describes the Dreyer case-hardened vibrator heads, the fabricated-rubber casing and flexible shaft, and the heavy-duty electric motor. Also covered is the Dreyer gas-line-powered vibrator.

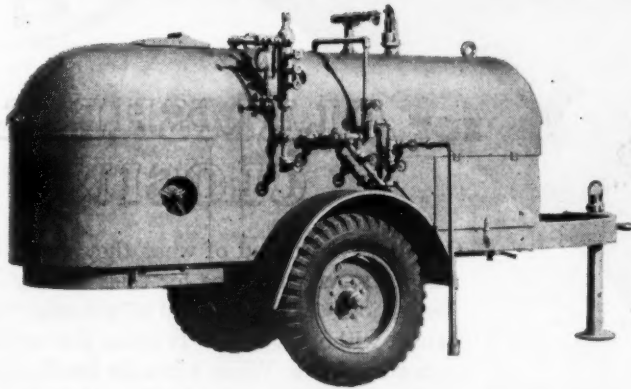
Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 67



VICTOR EQUIPMENT COMPANY, 844 FOLSOM STREET, SAN FRANCISCO 7, CALIF.



Cleaver-Brooks Tank-Car Heaters have Dry Steam in Tank Car Coils from a Cold Start in 20 Minutes OR LESS!



Cleaver-Brooks Mobile Tank-Car Heater—Not just a boiler on wheels, but a compact, rugged, highly efficient steam generator—built for a specific purpose. Available in two and three tank car heating capacities. Oil-fired, extra-high heat transfer design, dry-coil steam condensate return under pressure—no water or heat losses. Can also be profitably used for an all purpose unit for steam cleaning, thawing and heating.

THE tank car on the siding is the starting point for fast work on any oiling or bituminous surfacing job. The quicker you get the oil or asphalt up to application temperatures and flowing into the relay trucks or distributors—the faster your work crews can get going.

Cleaver-Brooks tank-car heaters are expressly designed to be shooting steam through tank car coils at 125 lbs. pressure in 20 minutes or less. And they can keep going full tilt all day with a very minimum of attention and work because a Cleaver-Brooks tank-car heater uses less fuel and water. Its extra high heat transfer design means fuel savings; its turbine type condensate return means less water... every drop of condensate goes back to the heater and under pressure. The capacity for long hours and tough jobs is built into every Cleaver-Brooks Unit. For detailed information write for bulletin RM-102.

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Hydraulic Dredging Enlarges Old Levee

Dragline Builds Retaining Dikes to Hold Fill Pumped From Either Side of Levee In 3-Mile Improvement

♦ ANOTHER section of old levee has been enlarged to the height and width desired by the U. S. Engineers, New Orleans District, in its unceasing battle to prevent floods in the Lower Mississippi basin. This latest improvement is part of a program to raise the East Atchafalaya Basin Protection Levee all the way from Morgan City to Ramah, La., near where the Atchafalaya River has its origin at the mouth of the Red River.

The section just enlarged begins about 5 miles above Morgan City and extends northward 16,600 feet, a little over 3 miles. It required 385,000 cubic yards of material. The work was done by Jahneke Service, Inc., at New Orleans, La., on a contract low-bid price of \$260,645. Started in August, 1946, the project was completed in August, 1947.

The enlargement was made by first building retaining dikes with a dragline along both toe lines of the new section, and then pumping in hydraulic fill until the new grade line was reached. The steam-turbine dredge Pontchartrain, with a 22-inch intake and a 20-inch discharge line, dredged the material, taking it from borrow pits on both the land and floodway sides of the levee.

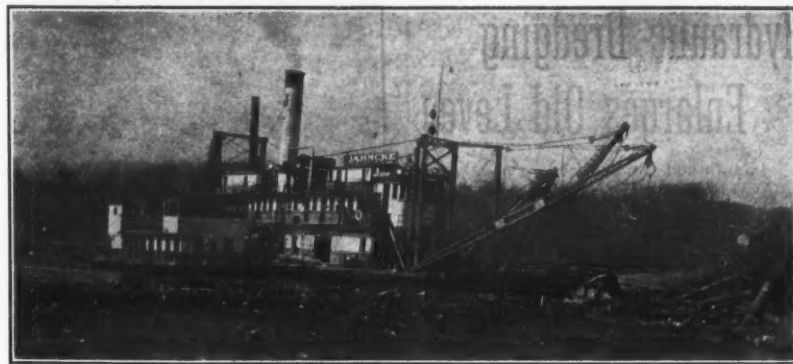
Water from 41 per cent of the United States flows through the Lower Mississippi in southern Louisiana en route to its outlet in the Gulf of Mexico. Naturally this flat lower-river valley, devoid of high banks, bluffs, or natural barriers, is continually subject to floods. These can be prevented only by man-made barricades. Taking advantage of existing works of nature wherever possible, the Corps of Engineers over the years has built supplementary structures to control and direct the flow of the flood waters.

Above New Orleans, for instance, the Bonnet Carré Spillway and Floodway has already protected the Crescent City from floods by diverting some of the

waters of the Mississippi into Lake Pontchartrain. From there they flow through the passes of the Rigolets and Chef Menteur into the Gulf.

Another safety valve lies west of the Mississippi near Angola, La., where the Atchafalaya River is connected to the Mississippi by a 7.6-mile stream known as Old River. Thus the Atchafalaya, flowing nearly due south to the Gulf, also provides an escape channel for some of the Mississippi's surplus water.

The Atchafalaya is a great river basin in its own right. Some say that in ages past the Mississippi itself flowed in its bed. In places the Atchafalaya, pronounced by soft-toned Louisianans to sound like "cheerful liar", has depths nearly equal to some of the soundings recorded in the Father of Waters. Both



C. & E. M. Photo

Alongside the dredge Pontchartrain of Jahneke Service, Inc., is moored the quarters boat which the 28-man land gang occupied during the recent levee-enlargement job.

the eastern and western boundaries of this great basin are rimmed with levees, as are the banks of the river itself, to form two great floodways. A plug in the right-bank levee of the Mississippi at Morganza, La., can be blasted open if necessary to divert the floodwaters through this gap, and down the Atcha-

falaya basin to the Gulf. But these protection levees must be strong and high enough to contain such waters.

The levees on the west side are now built to the required dimensions; on the east side the few sections that do not qualify are rapidly being enlarged. With

(Continued on next page)

HANDLING 37½ TON GIRDER

with 2 BAY CITY

CRANEMOBILE

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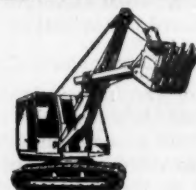
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Hydraulic Dredging Enlarges Old Levee

(Continued from preceding page)

the completion of this contract only a few more short sections need enlarging before the east side also has full protection.

New Levee Section

Constructed in 1938, the old levee withstood the last big flood in 1945 when the Bonnet Carré bays were opened and when the Morganza plug was almost blown up. It was topped and badly battered, however, and left with an irregular profile. The new levee is from 2 to 4 feet higher, having an average gross grade elevation of 17.5 above mean sea level. Its crown is 40 feet wide with the center point 1 foot higher than the edges for good drainage. Side slopes are 1 on 5, and the average width of the levee at ground level is around 200 feet.

For about the upper two-thirds of the contract the enlargement has been constructed directly over the old levee. But for a mile on the south end, the new alignment has been shifted about 50 feet towards the floodway side to preserve a gravel road carried on the crown of the old levee. In general the levee section is laid out from north to south on a very flat reverse curve.

Running along the floodway side of the levee is a branch of the Gulf Intracoastal Waterway. Through it vessels can sail from Plaquemine, La., on the Mississippi, where there is a lock in the right-bank levee, down to Morgan City and the Gulf. This, of course, is a much shorter route to the sea and deep water than if the Mississippi were followed to New Orleans and 110 miles beyond there to the passes into the Gulf.

At present a gap in the East Atchafalaya Basin Protection Levee at Bayou Pigeon, 40 miles above Morgan City, lets the Waterway shift from the east to the west side of the levee. Obviously this gap is a loophole in the protection system desired, but this is being rectified by the construction of a new lock in the levee at Bayou Sorrel. When this is completed, the Bayou Pigeon opening will be closed.

Originally the job was set up by the U. S. Engineers for the contractor to take all material for the levee enlargement from borrow pits along the floodway side. Because of the waterway along this side, the right-of-way extended anywhere from 700 to 1,200 feet out from the center line of levee, whereas on the land side the right-of-way limits are 200 to 750 feet from the center line. The intent was to widen the existing 9 x 100-foot waterway by dredging along its western bank.

Material for building the original levee had been obtained from borrow pits which now form the navigation channel. Although only a 9-foot depth is required, the existing borrow pits go down to -22.5 elevation, or 40 feet below the new gross grade of the levee. The contractor was permitted to widen this pit to the west, going down to the existing depth on a slope not flatter than 1 on 10, and beginning at a point averaging 400 feet from the center line of the levee. The other limit of the cut was to a point at the top of the 1 on 1 backslope which was at least 25 feet in from the right-of-way line. Over all the available borrow area the minimum dredging depth was established at -10.0 elevation so as to offer no hazard to navigation.

Contractor's Choice

After carefully weighing all considerations, however, the contractor decided not to avail himself of the material provided within the right-of-way limits on the floodway side to enlarge



C. & E. M. Photo

A Northwest dragline with a 50-foot boom and a Hendrix 1 1/4-yard bucket bulks retaining dikes to contain hydraulic fill on the Jahneke Service levee-enlargement contract.

the north half of the levee section. More suitable material for hydraulic fill was discovered on the land side of the levee. And the maximum depth to

which it was dredged was only 15 feet as against 22.5 feet in the waterway.

The pits that were obtained and paid for by the contractor are adjacent to Bayou Long. This bayou flows along the east side of the levee, so there was no problem to finding flotation for the dredge. The character of the material varied widely due to the deposition from old streams that crossed this area, but most of the pumped fill is a bluish-gray silty clay. The choice was a good one because an average of 15 per cent solids was easily maintained through the discharge line. This figure could have been increased if the risk of clogging the line had not been considered.

For the lower half of the levee, where land-side borrow pits were not easily obtained, the dredge was moved through Bayou Pigeon gap and put to work pumping from the floodway side.

Retaining Dikes

Before the hydraulic dredge began operations, retaining dikes first had to

be built to contain the pumped material needed for the enlargement, and the thickly wooded borrow pits had to be cleared. The dikes were constructed to an average height of 4 1/2 feet with 1 on 1 side slopes by a Northwest dragline. This unit used a 50-foot boom and a Hendrix 1 1/4-yard bucket, and worked from wooden mats. It skimmed the necessary material from the ground within the limits of the levee cross section so that the excavation, which was held to a maximum depth of 2 feet, would be replaced later with the hydraulic fill. Built at the toe line for the new enlargement, these dikes were about 35 feet beyond the toe lines of the old levee.

Two 8-hour shifts a day were worked by the dragline during which time about 500 feet of dike was constructed on an average. To permit the surplus water from the fill to run off, openings were left every 2,000 feet along the dikes. Into these openings wooden

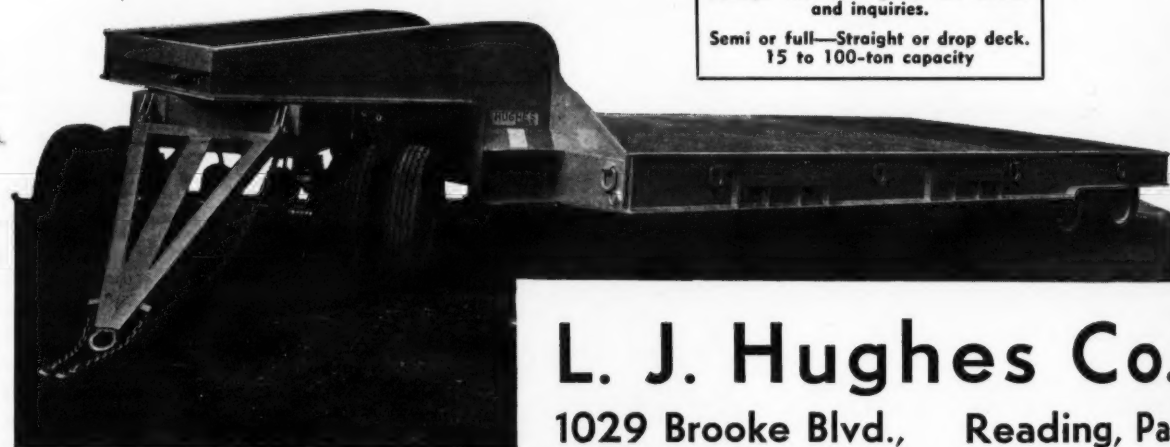
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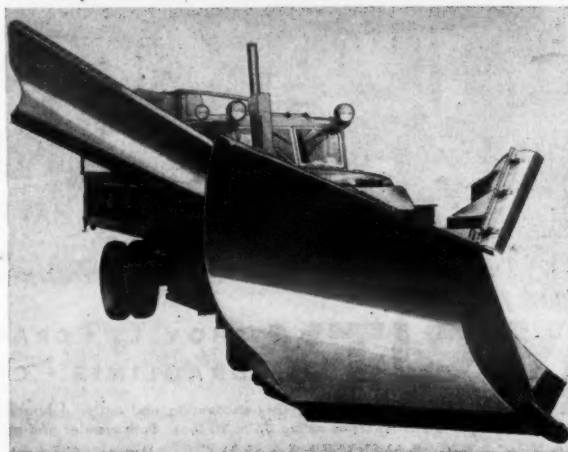
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Hydraulic Dredging Enlarges Old Levee

(Continued from preceding page)

sluices, 6 x 6 x 12 feet long, were built with 2 x 8's to which boards were added as the fill increased in height. Thus the solid material was not lost as the water escaped from each side into either the waterway on the west or the bayou on the east.

In the borrow areas a gang of 20 men with crosscut saws felled the trees but let them lie where they fell. A skidder rig was then anchored in the bayou along the bank of the borrow area. It consisted of a barge, 85 x 26 x 6 feet deep, with a 2-drum winch driven by an Allis-Chalmers UC-40 diesel engine. A sheave was rigged to a tree 400 feet away from the skidder, and 800 feet of 3/4-inch cable was run out, making a continuous loop. The trees and logs were fastened to the cable by a hanging line and skidded out to the edge of the bayou where they were piled up. They were removed later and sold to a lumber mill. This clearing was completed during the month of August so that dredging began in September.

Dredge Pontchartrain

The Pontchartrain, in her bright red and yellow paint, looks much younger than her years; she was launched in 1914 but has been rebuilt several times since then. The stout 5-inch wooden-frame hull measures 100 x 38 x 11 feet deep and draws 8 feet of water. As usual on dredging jobs, Jahncke Service, Inc., kept the dredge working 'round the clock, with a crew of 45 for the three 8-hour shifts. The dredge had accommodations for its crew, but the 28 who comprised the gang on land—clearing, setting pipe, building dikes, etc.—occupied a quarters boat that was moored to the dredge. Four meals a day were served: breakfast, dinner, supper, and another meal at midnight.

Aft is the boiler room where a boiler manufactured by Babcock & Wilcox under a White-Forster patent generates steam at 240 psi which is supplied at the rate of 35,000 pounds per hour. Its nine burners consume 150 barrels of bunker C fuel oil every 24 hours. The dredge has a 300-barrel tank, enough for two days' operation, but oil is stored alongside in two steel barges of 5,000 and 3,000-barrel capacity respectively. As soon as one barge was emptied, it was towed back 100 miles to the Standard Oil Co., of Louisiana refinery at Baton Rouge, La., for another load, while the dredge pumped oil from the other barge.

Water for the boiler was pumped directly in from overboard and then underwent an involved process of purification before being used. Sediment is removed first by a Hygeia purifier, a vertical pressure filter, after which the salt is removed by evaporation. A 2,500-square-foot surface condenser converts the steam back into water for the fresh-water make-up tank.

From there a Worthington de-aerating feed-water heater raises the temperature of the water to 212 degrees F. It is then directed to the boiler by a DeLaval-steam-turbine-driven boiler-feed pump operating at 3,600 rpm, head 715, and 96 gpm. A Copes marine-type regulator automatically controls the flow of water into the boiler.

From the boiler the live steam passes through a 5-inch line to an Elliott 1,300-hp steam turbine operating at 3,300 rpm which drives the main dredge pump. The used steam leaves the turbine through a 22-inch line under 26 1/2 inches of vacuum created by a Worthington 7 1/2 x 7 x 10-inch condensate pump. Then the steam is condensed back to water, heated, and returned to the boiler. In one hour 30,000 pounds

of steam is condensed to produce 5 per cent of the water originally on hand.

Operating Machinery

Besides the main turbine, which is located nearly amidships, the dredge has along the port side of the hold a G-E 400-hp steam turbine operating at 3,600 rpm with a direct drive to a G-E 300-kw ac generator. This unit furnishes power for all the motors on the dredge, and current for the lights.

The two principal motors that it drives are a Fairbanks-Morse 250-hp 600-rpm ac unit which, through a reduction gear, turns the cutter head at 23 rpm; and an Allis-Chalmers 60-hp ac motor that operates the Ellicott 7-drum hoist located forward on the main deck. Five of the drums are placed abreast. The center one is used to raise and lower the ladder; the two adjoining control the swing of the dredge; the two on the outside operate the long anchor booms. Behind these latter are the drums for lifting and lowering the spuds.

The Elliott dredge-pump turbine revolves at 3,300 rpm and through re-

duction gears drives the main Amsco (Continued on next page)

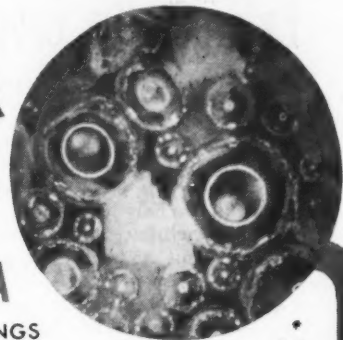
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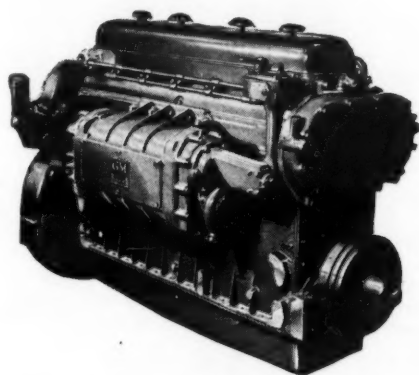
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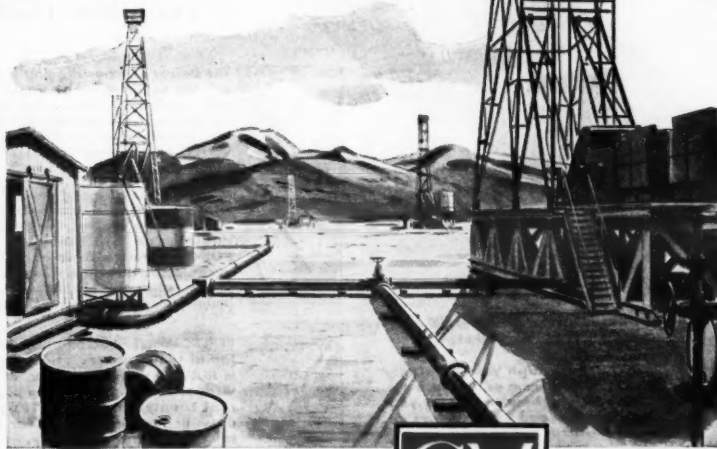
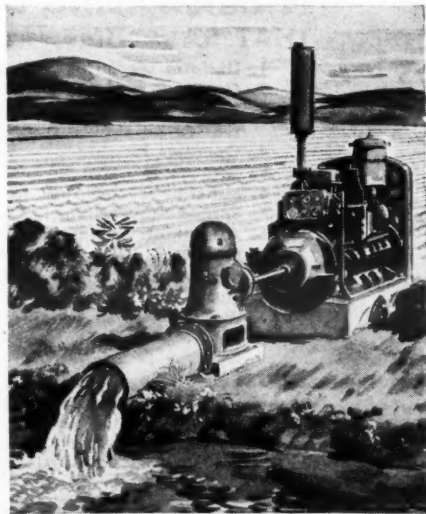
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**DIESEL BRAWN
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Hydraulic Dredging Enlarges Old Levee

(Continued from preceding page)

pump at 350 rpm. The pump has a 22-inch suction with a 20-inch discharge. On this job it used a 60-inch impeller with three vanes. The pump is located well forward in the hole just behind the hoisting gears, while overhead is a craneway carrying a triplex Yale & Towne 4½-ton hoist. This is used for servicing the pump in replacing parts, etc., or for lifting the manhole lid in the line just forward of the pump to remove debris caught in the line.

Digging is done by a 6-blade basket-type American Manganese Steel cutter head, 5 feet in diameter, at the end of a 55-foot ladder. The ladder can work in 42 feet of water, although the average depth worked on this job was only 15 feet. A 38-foot A-frame guyed to a 40-foot gallows supports the ladder. The intake pipe attached to the ladder has a U.S. Rubber 12-foot-long flexible joint where the connection is made to the pipe on the dredge which leads to the pump.

While the dredge was working in the borrow pit, trees on the banks were used for anchors as it swung over an arc of 220 feet in making a cut. A 1½-inch cable was used on the swing line. In the waterway the 60-foot anchor booms on each side were used with regular ship anchors attached to the line for swinging the dredge. Within the hull at the stern are the two 65-foot wooden spuds, 27½ inches in diameter and covered with ½-inch steel tubing. The one on the starboard side is the working or digging spud, while the port



C. & E. M. Photo

Floating line from the stern of the dredge Pontchartrain was carried on pontoons 22 feet long x 42 inches in diameter, two cylinders to each 50-foot length of pipe. Along the top of the pipe a 24-inch catwalk was constructed with a safety hand-rail.

spud is for moving or setting the dredge in position.

The Pontchartrain is controlled from the operator's cabin, located forward on the upper deck. Gages indicated that the vacuum on the intake line varied between 15 and 18 inches, while the back pressure on the discharge averaged from 60 to 75 psi. Another gage rigged up on the gallows indicates the depth at which the cutter head is working. The operator is in telephonic communication with the foreman at the discharge end of the pipe line on the beach. If the foreman reports that the material coming through is too thin, the operator speeds up the swing of the dredge so that more solids will be taken; if the material is too thick and might clog the line, the swing is slowed down so that more water is taken through the suction line.

An average of about 15 per cent solids was usually maintained; or putting it another way, 3 yards of hydraulic material had to be dredged to get 1 yard of fill on the levee. The dredge aver-

aged around 3,500 cubic yards in place on the levee per 24-hour day.

The dredge also has a small machine shop located amidships on the main deck around the hold. Besides the usual hand tools, workbench, and vise, power equipment includes a 16-inch x

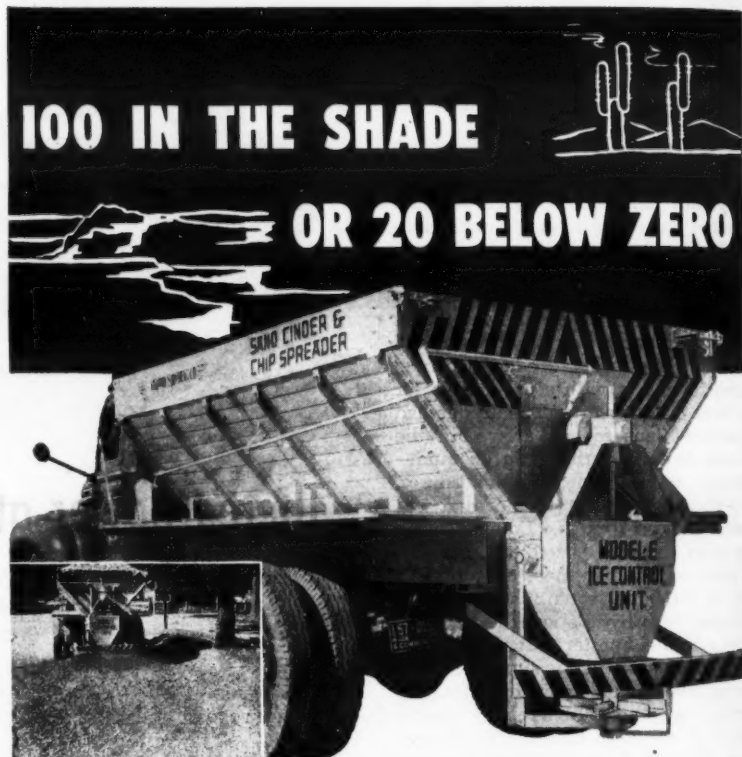
8-foot lathe driven by a 3-hp motor, and a motor-driven 8-inch emery wheel.

Discharge Line

From the pump the 20-inch discharge line is lifted to the deck on the starboard side. At that point it makes a right-angle bend and runs along on top of the deck outside the cabin to the stern. There it makes a swivel connection to the floating line by means of three Mobile Pulley & Machine Works 20-inch ball joints which are also used to join the 50-foot lengths of pontoon line.

The average length of the combined pontoon and shore line was about 2,500 feet, with more shore line required than floating line. Both types of pipe are Armco spiral-welded design; the land line came in 14-foot lengths and was connected by slip joints. On this job the maximum length of floating line was 1,262 feet and shore line 1,833 feet, for a total of 3,095 feet. On a former

(Concluded on next page)



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C. & E. M. Photo

At left, the discharge end of the land line sprays fill on the center line of the new levee through a baffle spreader plate. At right, a crew of Cajuns handles the pipe as its heavy discharge piles up on the levee. To the right in this picture is the telephone for communicating with the dredge; to the rear is a completed portion of the levee.

Hydraulic Dredging Enlarges Old Levee

(Continued from preceding page)

contract farther north on this same levee system, the Pontchartrain pumped a total of 6,600 feet; of this, 1,500 feet was pontoon and the remaining 5,100 feet was shore line.

Most of the pontoon line was floated on cylinders, 22 feet long x 42 inches in diameter, two cylinders to each 50-foot length of pipe. At each end the cylinders were connected by welding 4 x 6 x 1/2-inch angle irons across the top as strongbacks. Along the top of the pipe a 24-inch catwalk was constructed of 2 x 8 creosoted pine supported on eight wood 6 x 8 saddles of the same material. The saddles were fastened by two 1 1/4-inch bolts to angle irons welded to the pipe. A safety hand-rail was built on one side of the catwalk which also carried the telephone line.

A 5-man crew broke or added lengths as required to the shore line. The end of each length of pipe was supported by a simple scaffold of two 4-inch round posts, about 10 feet long, cut in the woods and driven in the ground on each side of the pipe. A 2 x 6 was nailed across the posts to hold up the end of the pipe. At the discharge end a special 2-foot section was attached with turn-buckles. This end piece was equipped with a baffle spreader plate which threw the discharge into the air like a fountain to prevent the force of its flow from gouging a hole in the levee.

Auxiliary Equipment

On a big dredging job there is always a certain amount of auxiliary floating equipment essential to the successful completion of the contract. On this project Jahncke used two tenders for towing and for transporting men and materials. Each was 32 feet-long, had a 9-foot beam, drew 3 feet of water, and was powered by an Atlas Imperial 75-hp diesel engine. Spare parts for the dredge and welding equipment were carried on a 75 x 40 x 5-foot-draft wooden work barge. Heavy equipment and materials, such as pipes, pontoon cylinders, etc., were handled by a wooden derrick barge, 38 x 18 x 3-foot draft. It was rigged out with a 32-foot A-frame and a Lidgerwood 2-drum hoist driven by a Ford V8 gasoline engine.

An auxiliary power plant was mounted on a 50 x 22 x 4-foot-draft barge in the event that anything went wrong with the main boiler on the dredge. Equipment on this barge included a 125-hp Atlas Imperial diesel engine that drove a G-E 90-kw ac generator.

The hydraulic fill was completed by April. After that there was a lull in operations until the material dried out enough for the dragline to trim the slopes to the 1 on 5 gradient. Material from the retaining dikes was removed,

so that the slopes would drain properly, and used to fill in any low places in the enlarged section. No seeding was required on these flat slopes which rapidly acquire a thick cover in the lush climate of sub-tropical Louisiana.

Personnel

The only item in the 3-mile levee enlargement was the 385,000 cubic yards of fill. Personnel of the Jahncke Service, Inc., included Captain O. C. Daussin, General Superintendent; Cap-

tain Val Kraemer and Horace Frisbee, Master and Chief Engineer respectively of the dredge Pontchartrain; and C. E. McAuley, Civil Engineer.

Supervising the contract for the U. S. Engineers was H. K. Lee, in charge of field headquarters at Morgan City, assisted by W. D. Stockman. W. T. French was Inspector on the dredge. The New Orleans District is headed by Col. John R. Hardin, District Engineer.

Diesel Engine Sales Plant

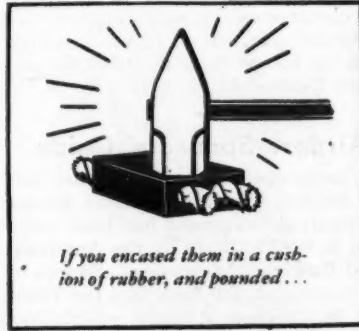
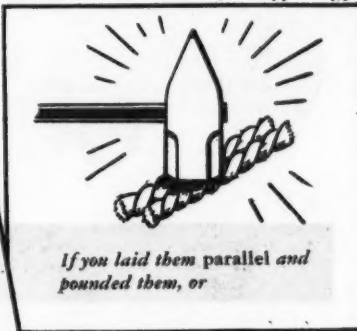
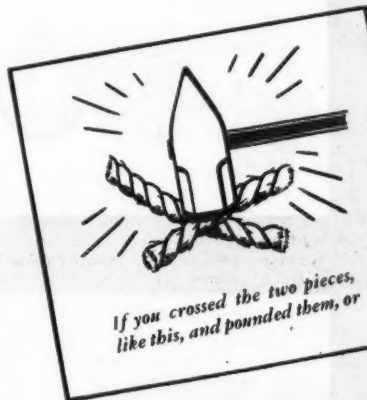
The opening of a new, modern diesel-engine sales and service plant has been announced by the R. C. Call Co. of Steubenville, Ohio. The Call organization is distributor for the Detroit Diesel Engine Division of General Motors Corp. Its territory includes West Virginia and the southeastern counties of Ohio for industrial engines, with the western half of Pennsylvania added for marine-engine sales. The company also maintains sales and service outlets in Charleston and Clarksburg, W. Va.

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The Maquoketa Scoopmaster, for loading, carrying, scraping, etc., has a capacity of 1 cubic yard with a depth of cut up to 4 inches. It is built for use with any wheel tractor.

Earth-Moving Scoop

An earth-moving scoop which can be used for loading, carrying, scraping, grading, and similar uses is made by the Maquoketa Co., Maquoketa, Iowa. Hydraulically controlled, the Scoopmaster is said to handle many types of earth-moving jobs.

It has a capacity of 1 cubic yard; width of cut is 5 feet; depth of cut is up to 4 inches; and it weighs 1,000 pounds. Overall length is 12 feet 4½ inches; width is 5 feet 5¼ inches; and overall height is 5 feet. Of the two-wheel trailer type, it is built for use with any wheel tractor, the manufacturer says.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 25.

Wheel-Mounted Hoist

A portable utility hoist for use on jobs requiring line pulls up to 1,500 pounds can be obtained from the Superior-Lidgerwood-Mundy Corp., Superior, Wis. A two-wheel dolly type of mounting makes it movable from job to job.

Model No. 160 has a 1,500-pound-capacity line pull at 150 fpm; Model No. 160 HS, 800-pound line pull at 275 fpm. Transmission ratio for the 160 is 3.79:1; for the 160 HS it is 2:1.

The drum is 4½ inches in diameter x 20 inches, between 16-inch-diameter flanges. It will hold 550 feet of ¾-inch manila rope or 1,850 feet of ¾-inch wire rope. One lever controls the transmission clutch, and one lever controls a shoe-type brake. Weight of the hoist is 700 pounds. It is powered by a 9-hp 4-cycle air-cooled gasoline engine.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 5.

Airport Sponsors' Guide

A comprehensive series of questions and answers concerning many phases of airport development has been compiled in booklet form by the American Road Builders' Association. Source of the material in the book was the Town Hall Meeting on Airports which was held in conjunction with the 44th annual meeting of the Association.

Questions asked the authorities present, and their answers, were recorded. With this as a basis, and with the addition of pictures and diagrams, this 112-page booklet was compiled as a guide for sponsors of airports. Construction, operation, financing, and many other phases are covered. The book is indexed by subjects for rapid location of all data.

Copies of Technical Bulletin No. 115, 1947, are available at the price of \$1.00 per single copy. Those desiring this book should send their money to the Association headquarters at 1319 F. St., N. W., Washington 4, D. C.

Hand Fire Extinguishers

A bulletin describing its hand fire extinguishers is available from the Union Stop-Fire Corp., 125 Ashland Place, Brooklyn 1, N. Y. Made in 1 or 2½-quart sizes, they are said to emit a

spray 20 to 30 feet long. The extinguishing fluid consists of a mixture of carbon tetra-chloride and carbon dioxide.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 66.

Spray Bars for Bitumen

Spray bars for use with most types of bituminous distributors are described in the catalog of The Earl Walker Co., Inc., 807 W. Jefferson St., Sullivan, Ill. The catalog tells the story back of the development of the Walker bar; it shows close-ups of it in action, and photographs of it installed on various types of distributors.

Feature of the catalog is a large center spread showing how the unit works, how it is built up in sizes to a 26-foot limit, how it is adjusted for use or for transporting, and other information.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 60.

SEALTEX CONCRETE CURING COMPOUNDS

SEALTEX Compounds are the result of extensive research and development work in conjunction with years of manufacture. They meet the exacting specification requirements of the U.S. Bureau of Reclamation, U.S. Army, U.S. Navy, other Federal Agencies; State Highway Departments, Counties, Cities; Engineers and Architects.

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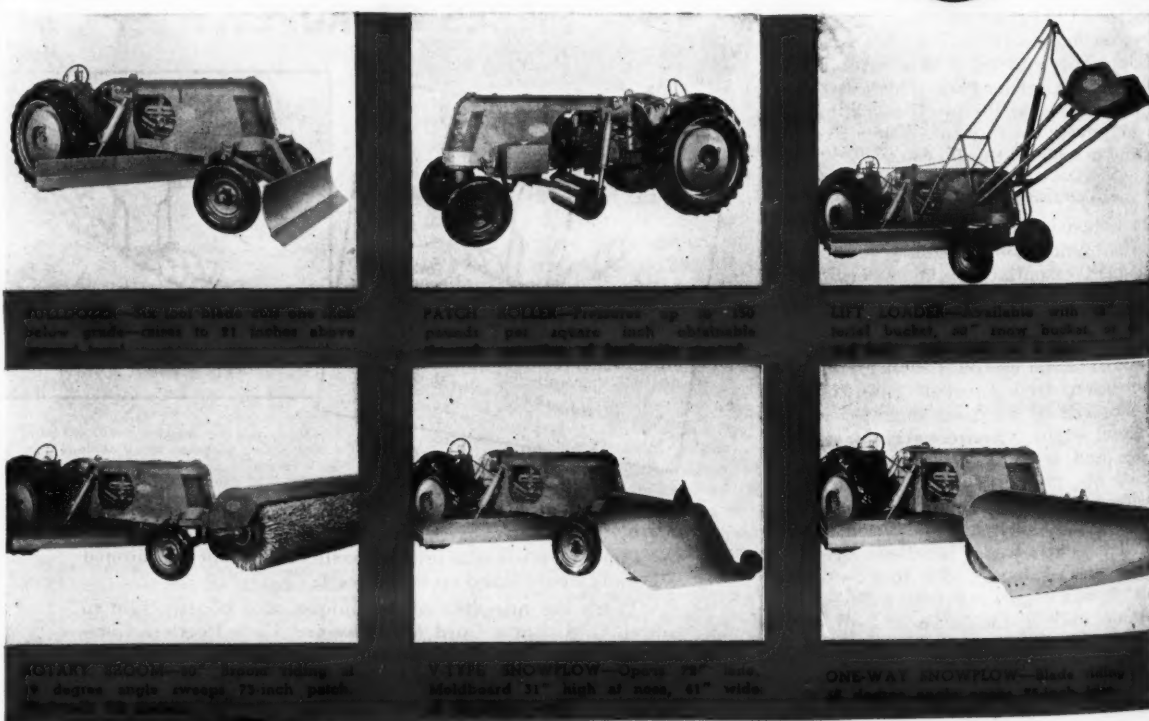
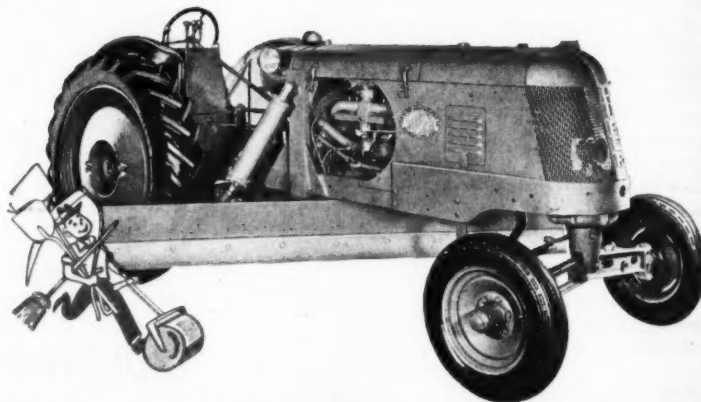
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HUBER MAINTAINERS

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C. & E. M. Photo
A D8-mounted dozer pushes logs aside in Emigration Canyon, Utah. Inaccessible terrain, heavy underbrush, and boggy soil made clearing on this road job a slow business.

Rush Rebuilding Of Mormon Trail

Brigham Young's Route Becomes New Secondary State Highway to Help Commemorate Centennial

UNDER two contracts totaling \$414,000, the Utah State Road Commission is speeding the re-creation of the old Mormon Trail 15 miles east of Salt Lake City. The two contractors hoped to have a passable pioneer road pushed through by July 22 to assist in the commemoration of one of the most dramatic moments in the history of the west.

Just 100 years ago July 24, a slow wagon train crawled down through Emigration Canyon in Utah. A band of Mormon pioneers sought sanctuary in the shadow of the everlasting hills. Ill, racked with fever, Brigham Young lay sick in a jolting wagon bed.

Worn equipment creaked as the tired ox teams tugged on the wagons. The caravan struggled towards the canyon's mouth. Finally the first wagons came out near the top of a small plateau, overlooking the broad salt plain. The scene was sagebrush and desolation—truly the land which Jim Bridger had warned would never grow even one ear of corn.

It was here that Young raised himself from his sickbed and said, with the inspired vision that was his, the now immortal four words, "This is the place!"

Since that early day Salt Lake City has grown to be one of the most beautiful in all the west: a center of art, music, and culture. The state of Utah has turned, within that century, to be a principal supplier of manufactured, raw, and agricultural materials to the nation. Small wonder then that good Mormons everywhere dedicated this year to commemorate the coming of the first pioneers.

Time Limit Pushes Contracts

As early as 1946 the first plans were made for the new highway, but various delays in plans and financing prevented contracts from being let. Late in the fall of 1946 the Utah Department of Publicity & Industrial Development, made available to the State Highway Department the sum of \$240,000. With state and Federal-Aid money thrown in, the first contracts to build the earth subgrade were possible.

W. W. Clyde & Co., of Springville, Utah, was the low bidder at \$206,000, on 5 miles west of Big Mountain summit over which the Mormons crossed just before they entered Emigration Canyon. Palfreyman Construction Co., of Provo, at \$208,000, was the low bidder on about 6 miles east of the summit. The inaccessible terrain, plus the delays due to a

wet spring this year, threatened the plan from the very outset.

There was an analogy between the contractors' situation and that of a century ago, though it was infinitely more important for Brigham Young's people to get through the canyon on time than it was for the contractors to get through on schedule. Had the pioneers not made it when they did, they might have starved that first winter. It was only by getting through on July 24 that they were able to start plowing at once and plant seed they had brought along from Nauvoo, Ill. That first crop of potatoes and corn saved their lives.

Jobs Are Tough

The new contracts, which provided only for the earth work and grading, called for the moving of about 60,000 cubic yards per mile. There was a total of approximately 100,000 cubic yards of solid rock in cuts, which called for the use of compressors and drills.

Some of the cuts were 80 feet deep;

some fills had to rise 100 feet. Maximum grades on the new road are 8 per cent, with quite a few curves built on a 100-foot radius. The finished embankment will be 26 feet wide, and will carry a gravel base course 20 feet in width, to be laid under a subsequent contract.

The walls of Emigration Canyon rise sheer and steep from the floor of a small stream. Covered with quaking aspen, oak, and willow trees, the underbrush

is almost impossible to penetrate. The soils are bad, and some can only be compacted to about 96 pounds of density per cubic foot, dry weight. The topsoil is black and rich in organic matter. Underneath is a layer of reddish-brown clay, and below that a bed of partly cemented conglomerate. Water will not readily penetrate this conglomerate bed, with the result that rain or

(Continued on next page)

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A TIME AND MONEY SAVER

The HOLEWIZARD

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SPECIFICATIONS

Capacity 1/4" to 3/4" Drills

Speed 1800 - 2000 S. P. M.

Weight only 8 lbs.

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Model No. 400
Half actual size

This cut-open view of the HOLEWIZARD shows the sturdy construction, and simple, fool-proof mechanism. A most careful selection of alloys, hardened and ground, insure maximum strength and light, balanced weight. Handle is aluminum.

The patented retainer absolutely prevents accidental release of drill or tool. Invaluable when working on scaffolds or over water. No possibility of accident, or delay through loss of tools.

TIME-MONEY SAVER

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C. & E. M. Photo

H. W. Griffin, Utah State Construction Engineer; Frank G. Lewis, Resident Engineer; and Willard Day, Commissioner, survey the old Mormon Trail grading job in wild Emigration Canyon.

Rush Reconstruction Of Old Mormon Trail

(Continued from preceding page)

snow holds in the clay and topsoil layers. It makes for a condition so boggy that it will mire a D8 tractor ten months out of the year.

Rising to an elevation of 7,400 feet at the summit, most of the Big Mountain area gets snow from October to May, with rain in between. Five inches of snow fell this past June.

Against such conditions, Clyde and Palfreyman pitted bulldozers, Carryalls, a pair of shovels, and hauling equipment. To make the situation even more urgent, a party of 147 Mormons, descendants of the early pioneers and led by the President of their church, George Albert Smith, planned to retrace the original route of Brigham Young in July. From Nauvoo, Ill., their motor caravan would follow the old road, with nightly stops at some of the old camp sites of the pioneers. On the morning of July 24 the cavalcade was scheduled to enter Emigration Canyon and pass Brigham Young's last camp site.

Clearing and Pioneering

With all the road on new location, not accessible even to any county roads, clearing and pioneering for the new route was one of the toughest jobs attempted in years near Salt Lake City. One day when the first bulldozer arrived and attempted to "ride" down a steep slope behind a blade full of dirt, as is customary in mountain-road pioneer work, the soggy top layer refused to hold up. The D8 slid, nose first, all the way down the slope, coming to rest in the creek bottom. Fortunately the operator was not hurt.

Under such conditions as these, clearing and the first cuts were opened up. It was slow business, of course, particularly when rain stopped even a big tractor. Where the tractors could reach the quaking-aspen growth, they pushed the trees over, piled them, and the brush was burned with the help of diesel fuel. On extremely steep slopes

where a tractor is prone to lose control, the trees were cut down by a labor crew.

Angledozer were used on both jobs to open up the first earth cuts. Until these cuts could be dug down enough to get some kind of bench for other equipment to work from, the dozer was king.

Both contractors used the same general methods of excavation. W. W. Clyde & Co. used seven Caterpillar D8's, one of which was hitched to a LeTourneau Carryall. Palfreyman Co. brought in two D8's, three D7's, a D6, and an aged 50 gas tractor to do the same job. Both outfits used a 315-cfm compressor with from four to five air drills. Where W. W. Clyde used a 1½-cubic-yard Koehring shovel with three Koehring Dumpers to excavate on the more secure footing, Palfreyman used a ¾-cubic-yard Bucyrus-Erie and an American Gopher shovel with trucks. The trucks had to be towed in by tractor before they could work.

In the same way that crews of axe-



C. & E. M. Photo

Workmen install concrete-pipe drains under the subgrade-to-come, on the Mormon Trail reconstruction job, to take care of heavy drainage.

men cut a path for the pioneer wagon train, the bulldozers blazed the route for the heavier, more cumbersome equipment to follow. Had it not been

for the pioneer work of the Donner party in 1846, the Mormons might not have made it through to Salt Lake in (Concluded on next page)



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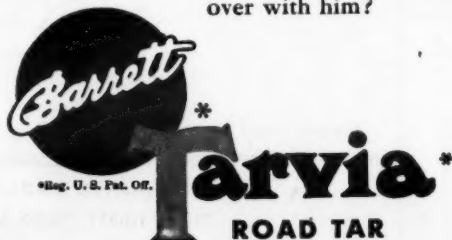
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Rush Reconstruction Of Old Mormon Trail

(Continued from preceding page)

time. By the same token, the pioneer work on the same route today is making further development work possible.

Fill Construction Is Slow

On account of the high moisture content, processing of fills on the new route was well-nigh impossible. Both jobs had a sheepfoot roller, but there were times when it could not be used. There were times, of course, when the whole job closed down. But wherever possible, the machines selected the driest material to build the fills. A great deal of blasted rock was also worked in to these locations, to the consequent betterment of the embankments.

There is very little to be done for the soggiest material except to by-pass it as long as possible, hoping meanwhile that it will dry.

The contractors made excellent progress, in view of the wet spring and the abnormally heavy rainfall in June. The work had advanced sufficiently for the cavalcade to traverse the old pioneer route by using the new roadway grade and its detours, provided the weather was good. But unfortunately, when the great day came, with it came the threat of rain which would have made travel over the old road difficult if not impossible. So the party did not complete its trek over the route of its forefathers after all.

Personnel

The job was actively directed by State Construction Engineer R. W. Griffin. Roy W. McLeese is Chief Engineer and Ray H. Leavitt Chairman of the Utah State Road Commission. On-the-job supervision was directed by Frank G. Lewis, Resident Engineer.

Concrete Weigh Batcher

A bin and batching unit for handling concrete aggregates is described in a bulletin issued by the Winslow Government Standard Scale Works, 25th and Haythorne, Terre Haute, Ind. It is designed for projects using mixers up to and including the 10-S, 14-S, and 16-S. It is made with either two or three material bins, and is available for immedi-

ate shipment.

The bulletin describes the weigh hopper, the scale equipment and scale-leveling device, the manner of loading, and other features of the Binanbatch unit. Specifications and construction features are fully described. Photographs show the unit assembled, dismantled and loaded for shipment, and in operation on a construction job.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 73.

Clean Drinking Water For Men in the Field

A portable water carrier is made by the Dixie Cup Co., Easton, Pa. This unit supplies workers in the field with sanitary cups and clean drinking water.

Made of stainless steel, it is olive-green with chrome trim. Capacity is about 4 gallons. It is 18 inches high, 15 inches long, and 8 inches wide. It has a recessed faucet which turns off automatically when released. A lug is provided for a single or double-unit Vortex paper-cup dispenser. The double-unit dispenser has a receptacle for used cups. Two adjustable carrying straps are provided.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 3.

Tractor-Scraper Rig Hits Speed of 18-Mph

A rubber-tired tractor and scraper combination has been announced by the LaPlant-Choate Mfg. Co., Inc., 2920 First Ave., Cedar Rapids, Iowa. The tractor, of the two-wheel design, is equipped with a 225-hp Buda diesel engine and extra-large Goodyear Sure-Grip 21:00 x 29 tires. It has four speeds forward and one reverse. Top travel speed is 18 mph at 1,800 engine rpm, according to the manufacturer's specifications. Fuel capacity is 104 gallons.

The scraper is of the positive-forced-ejection type, operated by an air-actuated cable power-control unit, mounted on the rear of the tractor. It derives its power from the main engine. Steering of the unit is accomplished by two double-acting hydraulic jacks, positively controlled by a fluid power unit mounted on the front of the tractor.

The Moto-Scraper is equipped with four-wheel brakes, air-actuated, with



The new LaPlant-Choate Moto-Scraper, Model TS-300, is shown here on a road job at Boise, Idaho. Capacity of the scraper is 17.5 yards.

controls arranged in such a way that braking power can be applied to the scraper wheels alone or to the complete unit. Capacity of the scraper is 17.5 yards.

It has a length of 34 feet 10 inches; width of 11 feet 6 inches; height of 9 feet 3 1/2 inches; and total weight of 42,500

pounds. Its wheelbase is 21 1/2 feet, and it has a level turning radius of 27 feet. The manufacturer states that 70 per cent of the empty weight of the unit is concentrated on its front axle.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 48.

TO SPEED JACKING WORK ON ALL CONSTRUCTION JOBS



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Every Simplex Jack and Jenny is pre-tested to 50% over rated capacity for extra safety. Other features that give easier, faster, more dependable operation include Neoprene packing seals, pressure tested bases, a long pump stroke that requires less effort, operation either horizontally or vertically.

For difficult jobs such as pulling wheels, gears or shafts on construction equipment, there's the Simplex Jenny. Its patented "center hole" principle makes it possible to do these and similar tough pulling operation in minutes instead of hours. The Simplex-Jenny also serves as a press or for conventional jacking work.

SIMPLEX-JENNY CENTER HOLE PULLER



Saves time,
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The Kinney Distributor is an extremely economical and profitable machine. A simple three-way valve controls loading, circulating and spraying—provides instant starting. The large handwheel controls wide lateral movement of spray bar for exact register at road edges or successive strips. The high capacity Kinney Rotating Plunger Pump

is accurate as a meter and applies all grades of bitumen uniformly in exact quantity specified. The Kinney Distributor shown is applying a surface treatment at exactly 0.5 gal. per sq. yd.—note the uniform application and close matching of strips.

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KINNEY MANUFACTURING COMPANY

Washington St., Boston 30, Mass.

We also manufacture Vacuum Pumps, Liquid Pumps and Clutches.



The Wayer Impactor can be used to tamp asphalt, concrete, resurfacing and patching materials, gravel, stone, clay, etc. It comes in a medium-heavy and heavy-duty model, and delivers 1,500-pound blows at the rate of 2,200 per minute.

Mechanical Tamper Is One-Man-Operated

A new portable tamping tool has been introduced by the Chicago Precision Machine Co., 920 So. Michigan Ave., Chicago 5, Ill. Known as the Wayer Impactor, it can be used to tamp asphalt, concrete, resurfacing and patching materials, etc. It can also be used on gravel, stone, clay, etc., according to the manufacturer.

The Wayer Impactor is available in two models, the No. 20 and No. 36. Model No. 20 is designed for medium-heavy jobs and weighs less than 200 pounds; Model No. 36 is built for heavy-duty use and weighs 387 pounds. Speed of travel is said to be 32 feet per minute while tamping. The limit delivers 1,500-pound blows at the rate of 2,200 per minute. Power is provided by a Wisconsin gasoline engine.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 46.

Carmichael Returns to Ky.

The Kentucky Department of Highways has announced the return of H. St. G. T. Carmichael, Jr., to his position of First Assistant Chief Highway Engineer. For the past year he has been Chief Engineer with a construction firm in the Philippine Islands.

Mr. Carmichael will coordinate the survey now being conducted by the Department to perfect a long-range program of road development and maintenance. He holds a degree in civil engineering from Virginia Military Institute and in business administration from Harvard.

Sales Manager for Alemite

The appointment of Gustave Trefeisen as Sales Manager for the Alemite distribution division has been announced by Stewart-Warner Corp. of Chicago. He replaces Charles I. Kraus, who is now the Alemite distributor at Minneapolis, Minn.

Blasters' Batteries

A battery to supply power for detonating mechanisms is available from the Eveready Division of the National Carbon Co., 30 E. 42nd St., New York 17, N. Y. The Mini-Max No. 493 is a 300-volt battery, consisting of 200 Mini-Max flat-type cells connected in series.

Weight of the unit is 1 pound 1 ounce. Overall dimensions are 2 11/16 x 2 7/32 x 3 13/16 inches. Terminals are of the flush-pin-jack type.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 14.

Arizona Sales Co. Formed

A successor has been formed to the Mine & Smelter Equipment Co., it has been announced. The new organization, Mitchell-Kennedy Machinery Co., Inc., P. O. Box 2207, Phoenix, Ariz., will continue in the sale and rental of construction equipment.

President of the new firm is Deane K. Mitchell, owner of the former company and, prior to that, General Sales Manager of the Novo Engine Co., Lansing, Mich. He is assisted by Thomas W. Kennedy, Vice President, who was formerly with the Taylor Tractor Co., and the Blake Equipment Co., of Columbus, Ohio.

Rock-Boring Machine

An 8-page catalog on the McCarthy rock-boring machine has been made available by the Salem Tool Co., Salem, Ohio. The McCarthy tool will drill holes from 6 to 16 inches in diameter, either horizontally or vertically. It can be

used for removing overburden on highway projects, drilling holes under highways for electric, gas, or water pipe lines, and similar uses.

The booklet contains descriptions and illustrations of the tool in action in both horizontal and vertical positions. It also points out features and time and labor-saving advantages claimed for it. The McCarthy tool is available as a self-propelled, truck-mounted, or trench-type model.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 84.

Portable Heating Units

Descriptive literature covering its line of portable gasoline-burning heaters has been made available by The Herman Nelson Corp., Moline, Ill. Form No. 2703 deals with the Models GT-3050, GT-3054, and GT-3059.

The folder tells about the use of the heaters for drying, thawing, spot heating, etc., to speed up construction work in cold weather.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 61.

Clean Heavy Equipment With Time-Saving Oakite Steam Gun

YOUR best bet for cleaning cranes, crushers, diggers, excavators and other heavy-duty equipment is fast, low-cost steam-detergent cleaning, utilizing the Oakite Solution-Lifting Steam Gun.

Combining the triple effectiveness of heat, steam pressure and vigorous Oakite detergent action, the Oakite Solution-Lifting Steam Gun disposes of tough cleaning jobs in a fraction of the time ordinarily required. It thoroughly removes grease, oil and road grime from even the most inaccessible places.

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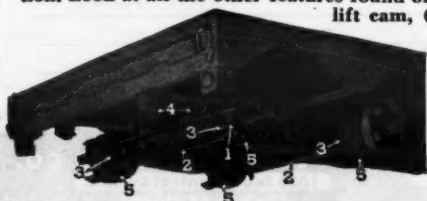
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Plant-Mix Surface For Widened Road

(Continued from page 1)

by gravity from the tank which was filled at near-by creeks with the help of a Rex 3-inch pump. Any large chunks of the lime rock were broken up into fine material with the scarifiers on the graders as each course was laid. It was further pulverized and compacted by two 10-ton 3-wheel rollers, a Buffalo-Springfield and a Galion.

When the widening was completed, the motor graders pulled the excavated trench material back on the shoulders and shaped them to a 6 to 1 slope. Later on, a separate earth-work contract is expected to be let for widening the present 2 to 3-foot shoulders.

At this point the prime contractor, Duval Engineering & Contracting Co., sublet all the bituminous work, including the surfacing, to R. T. Gordon & Co., also of Jacksonville. The latter contracting company had just completed a plant-mix job of its own in that same area; it still had its Barber-Greene Model 848 continuous-mixing plant set up and ready for operations at the Yulee siding of the Seaboard Line just off State Route 200.

Continuous-Mixing Plant

The continuous-mixing plant, while rated at 110-ton production per hour, never got capacity tonnage because of the time of the year that the work was carried on—from the middle of January to the latter part of February. Plant-mix could not be laid unless the temperature had reached 45 degrees F and was rising, and work ceased when a falling temperature touched 55 degrees F. Thus the normal 10-hour work day was seldom worked in entirety; 9 hours was considered a good average, with from 800 to 900 tons mixed and laid in that time. The best performance for a single day was 996 tons.

In Florida specification parlance, the surfacing used is known as "retread surface-course plant-mix Class C". This consists of No. 13 aggregate, which is graded from 3/4 inch down to 1/4 inch, mixed with RC-5 asphalt at the rate of 0.5 gallon to the cubic foot.

Slag was the aggregate used. It was supplied by the Woodstock Slag Co., of Woodward, Ala., and shipped to the plant siding in gondola cars. These were unloaded by the same Northwest crane which handled the lime rock. The material was stockpiled against a wooden barrier and was pushed towards a reciprocating feeder set beneath an opening in the stockade by an International TD-18 tractor-dozzer.

The wooden barrier, 18 feet high x 40 feet long, was erected by nailing 2 x 8's horizontally to 24-foot pine poles set in 6-foot post holes on 4-foot centers. The poles had 8-inch tips and 12-inch butts, and were strengthened by wire guys from the top to deadmen in the ground.

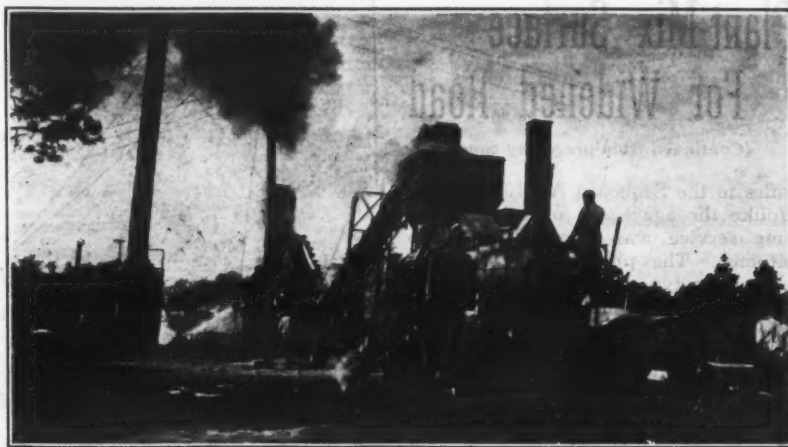
Getting and maintaining a workable stockpile of slag was the biggest job problem. The distance over which the 50-ton-capacity cars were shipped is 450 miles, and delivery usually took about one week when the necessary cars could be obtained. This at best was an uncertain element. To prevent shutdowns for lack of material, the contractor planned for a stockpile of 90-car capacity.

The slag usually contained about 5 per cent moisture by the time it was ready for use. This was too wet to meet the desired 3 per cent or less necessary to keep the bitumen from stripping away from the aggregate. The high moisture content was overcome by heating the slag from 225 to 300 degrees in driers equipped with two

Hauck torches instead of the usual one torch.

From the reciprocating feeder the slag was raised on a 22-foot cold bucket elevator to a chute with a center partition which divided the flow of aggregate to twin parallel driers, 4 feet in diameter x 24 feet long, with the torches located at the opposite end. A 12-foot-high smokestack with a steam blower rose above the intake end to remove the smoke and dust. The feeder, cold elevator, and driers were driven by a Buda 6-cylinder gas engine.

At the outlet ends of the two driers the slag dropped through a common chute to the bottom of a 60-foot-long belt conveyor, driven by an International B12 4-cylinder gas engine. The conveyor raised the material to the top of an 8-ton bin. As only one type of aggregate was used in the mix, no screening was necessary. Thus the slag dropped through the bin to a gate set at an 8 3/4-inch opening. This fed the material to a 12-foot belt which carried it along to the pugmill.



C. & E. M. Photo

This photo of the Barber-Greene Model 848 continuous-mixing plant, set up by R. T. Gordon & Co. for bituminous paving on U. S. 17, shows a truck loading in the foreground, and, in the rear, the dual driers used to overcome high moisture content in the slag. The boiler is at the left rear.

The other ingredient of the mix, the RC-5 asphalt containing 8 to 10 per cent naphtha, was purchased from the

Mexican Petroleum Corp., at Savannah, Ga. It was shipped in tankcars 150
(Continued on next page)

A GREAT UTILITY FINDER . . .

BACKHOE

An accessory to the Sargent Overhead Shovel, the Backhoe will dig a trench up to 7 or 8 ft. deep through gravel, clay, shale or boulders.

Here's a tool that helps you get maximum use from an Oliver-Cletrac Tractor.

BULLDOZER

Another accessory to the Sargent Overhead Shovel, the Bulldozer or Bullgrader can be attached in 15 minutes. It has plenty of down pressure for building new roads, backfilling trenches, or any other job where a bulldozer is needed.

With a 1 1/2 yd. snowbucket, the Sargent Overhead travels where needed in city or town under its own power or in a truck. It's a fast one-man loader, moves around obstacles easily and does not interfere with traffic. And it works all year 'round.

SNOWLOADER

The Sargent Overhead Shovel loads in direct, straight-line action with no twisting and turning. With accessories this unit will do a great variety of maintenance and construction work for contractor and Public Works Department.

POWER SHOVEL

For Full Information Contact Your Oliver-Cletrac Dealer

GOOD IN ANY
POSITION ON THE
DIAMOND

MADE BY

MAINE STEEL INC., S. WINDHAM, ME.

The SARGENT OVERHEAD

Plant-Mix Surface For Widened Road

(Continued from preceding page)

miles to the Seaboard Air Line siding. Unlike the aggregate, overnight shipping service was obtained with the bitumen. The plant boiler, a 30-hp locomotive-type oil-burning unit, was located near the driers. It was used when necessary to heat the asphalt in the tankcars to 150-200 degrees F, so that the material could be transferred to the storage tank.

Fuel oil for the boiler and driers also came to the siding in tankcars shipped from Savannah. It was unloaded by a Worthington 2-inch steam pump through a 2½-inch underground line to an 8,000-gallon tank located alongside the asphalt-storage tank. Two other Worthington steam pumps placed near the boiler drew fuel oil from this tank. A 1½-inch unit pumped oil to the torch on the boiler, while a 2-inch pump sent the oil to the four drier torches. The boiler carried 150 to 175-pound steam pressure to atomize the oil in the drier torches.

A Littleford 3-inch pump driven by a Le Roi gas engine pumped the asphalt from the tankcars through a 3-inch jacketed underground line to a 12,500-gallon horizontal storage tank. The tank rested on a foundation of cross ties placed alongside the track siding. From this tank the mixing-plant pump drew the asphalt through 40 feet of 4-inch jacketed line to the 800-gallon auxiliary tank of the Barber-Greene; from there it was metered in the correct proportion to the pugmill.

As the slag dropped into the continuous-mixing box, it was sprayed with bitumen. The mixed ingredients were discharged over a belt to the outside where trucks ran under the conveyor to get loaded. A Buda 6-cylinder 140-hp gas engine drove the pugmill and the conveyor feeder belts on each side. At the discharge end of the plant a 5-foot-high smokestack drew off the smoke, dust, and fumes to the greater efficiency and comfort of the man who controlled the flow of plant-mix into the trucks.

The mix was loaded into a fleet of the contractor's Mack trucks, averaging 16 to 18 units for the average 6-mile haul. Loads of 6 tons were carried on each truck. Little heat loss was noticed in the material, which was between 200 and 220 degrees F. when it was loaded into the trucks. The truck bodies were mopped out with a 50-50 mixture of water and fuel oil after every two or three trips. Weights were recorded before the trucks left the yard on a Fairbanks registering 30,000-pound beam scale.

Laying the Mix

Before any plant-mix was laid, a tack coat was applied half the pave-



C. & E. M. Photo

A Barber-Greene Finisher lays retread plant-mix from ¾ to 3 inches thick on U. S. 17 in Florida. Two of these units worked on the job, but only one at a time.

ment width at a time. It consisted of asphalt. The shooting was done with an Etnyre 1,350-gallon distributor

mounted on a Mack truck through a 12-foot spray bar. Only half a day's run was applied at a time so that traffic would not have to travel over it.

The tack or paint coat was followed immediately by a Barber-Greene Finisher which laid the plant-mix in a single course from ¾ to 3 inches thick, according to the amount of material necessary to achieve a smooth-riding surface. The maximum thickness was more representative of the job than the thinner layer.

Laying a 12-foot lane, the Finisher usually worked 2 days on one side. Then a second similar machine laid the other half of the pavement to complete the full width of 24 feet. Only one Finisher worked at a time. Two tandem rollers, a 10-ton Buffalo-Springfield and an 8-ton Galion, compacted the material and maintained a crown of ¼ inch to the foot. During the paving operations, traffic was maintained on half the road, and the newly laid section

(Concluded on next page)



Workmen place Bethlehem Bar Mat in top of concrete slab. Nearly 93,000 sq yd of mats were used in this new road.

New 6½ mile Stretch in Highway to Thousand Islands



Joseph Sullivan (left), Engineer, N. Y. State Dept. of Highways, checks a detail of the job with Charles Cunningham, Superintendent (center), and Jack Canino, Office Superintendent, of Bero Engineering and Construction Co.

Long popular with motorists approaching the Thousand Islands from the west, New York's Route 3 originates at Hannibal, travels eastward some fifteen miles, then swings abruptly north to skirt the eastern fringe of Lake Ontario.

These photographs show recent construction of a new 6½ mile, 2-lane stretch of Route 3 from Fulton to Palermo. Bero Engineering and Construction Co., Buffalo, is the general contractor. Bar mats and reinforcing for two concrete bridges, furnished by Bethlehem.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

STEEL FOR HIGHWAYS

Road Joints • Reinforcing Bars • Bar Mats • Guard Rail Tie-Rods • Guard Rail Posts and Brackets • Spikes • Wire Rope and Strand • Hollow Drill Steel • Fabricated Structural Steel • Bolts and Nuts • Sheet and H-Piling • Timber Bridge Hardware



Truck empties batch into the paver skip. Note Bethlehem Bar Mats in foreground, ready for placing.



Sticky stuff! With bar mats covered, workers spade excess concrete ahead of screed. Second screed in background.



With aggregate and bulk cement hoppers close at hand, trucks have but short haul to skip. Strip in foreground is ready for hand finishing.

WON'T QUIT or cause time out



A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

The Hayward Company

32-36 Dey Street
New York, N.Y.

Hayward Buckets



"On your toes, fellows—here comes the boss!"

Plant-Mix Surface For Widened Road

(Continued from preceding page)

tions were opened to traffic after 24 to 48 hours. The interval was later set at 48 hours due to density of traffic.

The plant crew consisted of 12 men, but only 8 were required on the road: foreman, Barber-Greene operator, screed adjuster, laborer around the Finisher to direct the trucks and assist in emptying them, two roller operators, and two flagmen to handle traffic maintenance.

Quantities and Personnel

The major items included in this 11.7-mile widening and surfacing contract were:

Line-rock base, 10 inches thick	40,833 sq. yds.
RCJ tack or paint coat	19,776 gals.
Plant-mix surface course	9,064 tons
Runners for plant-mix	156,557 gals.

The contractors' superintendents on the project were C. P. Johnson for the Duval Engineering & Contracting Co., and E. C. Pearce for R. T. Gordon & Co. For the Florida State Road Department, Emory P. Butler was Project Engineer. The contract was supervised by the Second Division of which John R. Slade is Division Engineer with headquarters at Lake City. F. Elgin Bayless is Chairman of the Department, and E. C. DeGarmo is State Highway Engineer.

Cuts and Prepares Belts for Splicing

A device for preparing most types of belts for splicing is made by the Paxton-Mitchell Co., 2614 Martha, Omaha 5, Nebr. It is known as Safe-N-Ezy Belt Cutter. It cuts and punches belts to match standard splice fittings.

It is made in two sizes, for V-belt Alligator type or DR type fasteners: Model V 1-2 for 1-inch two-nail Alligator fasteners; Model V 1-3 for 1-inch three-nail Alligator fasteners; Model V 2-5 for 2-inch five-nail Alligator fasteners. Also the VC 2-2 will cut and punch the 2-inch Cog-type V belts and the VS 2-2 cuts and punches the 2-inch solid-type V belts, both for use with DR type fasteners.

There are five models available for flat-belt fasteners: The F 2-2 for 2-inch two-bolt fasteners; F 4-2 designed for 4-inch two-bolt fasteners; F 4-4 for 4-inch four-bolt fasteners; F 5-3 for 5-inch three-bolt fasteners; F 5-4 for 5-inch four-bolt fasteners.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 35.

District Offices for Nelson

Three district offices have been opened by The Herman Nelson Corp., Moline, Ill., manufacturer of portable heaters and ventilators. Lincoln H. Cornell will manage the New York sales district from his headquarters at 150 Broadway, New York City. John H. Heintz will be in charge of the Cleveland sales district, with offices at 629

Euclid Ave., Cleveland, Ohio. Kenneth A. McIntyre will operate the Moline sales district from the home offices in Moline.

Equipment and Supplies For Surveyors, Engineers

A revised edition of its 50-page illustrated Catalog No. 50 has been made available by W. & L. E. Gurley, Station Plaza, Troy, N. Y. The catalog includes detailed analyses of Gurley transits, engineers' levels, precise leveling rods, alidades, and topographic instruments and equipment. Hydraulic measuring instruments, water-level recorders and indicators, field supplies, and wind instruments are also discussed.

Indexed for handy reference, the catalog also contains information on ordering, repair services, instrument manuals, and other miscellaneous information.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 52.

WANTED: Tough Hammering Jobs!



For Power Specify **"Van Dorn"**

DIV. OF BLACK & DECKER MFG. CO. PORTABLE ELECTRIC TOOLS

Van Dorn Electric Hammers drill in concrete, stone or brick—chip, clean and scale metal—gouge, shape and notch timber—drive spikes—tamp and vibrate concrete forms—scuff concrete surfaces and remove form marks—handle everything from seaming and caulking to heavy demolition. Light, compact, completely self-contained. Operate from A. C. or D. C. outlet or portable generator. Ask your Van Dorn Distributor or write for our free "Electric Hammer Handbook" to: The Van Dorn Electric Tool Co., 787 Joppa Road, Towson 4, Maryland.

Open-road insurance

FOR NEXT WINTER!



Battling blizzards is the toughest of all highway maintenance jobs. To help you lick that job, Walter Snow Fighters bring you the fastest, surest, most thorough method of keeping highways and roads open.

Walter Snow Fighters do more than clear up after a storm—they keep pace with it. With the

great power and traction of Walter Four-Point Positive Drive, you clear your highways at speeds of 20 to 30 mph., throwing snow far to the side. You clear more miles per hour—remove a greater volume on each run. You are not stalled at deep drifts, because you have tremendous tractive power to blast through and keep going.

Yes, a Walter is every inch a Snow Fighter—scientifically designed, powered and built for gruelling work—from its special drive system, right through plows, controls, hydraulic equipment, cab, lights and every detail that provides efficient clearing and easy handling.



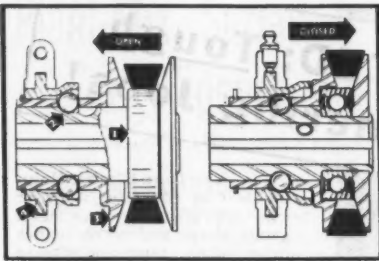
See your WALTER distributor now . . . for new equipment—genuine Walter parts—or expert, factory-trained service.

WALTER MOTOR TRUCK CO.

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WALTER

SNOW FIGHTERS



These diagrams of the Ball-lok V-belt friction-drive clutch show (1) the fixed flange of the V-belt sheave, (2) the free-rolling steel balls which carry turning and locking forces, (3) the sliding clutch sleeve which carries the balls forward to drop into their pockets, and (4) the cam sleeve which locks the clutch against the balls in driving or driven positions.

V-Belt Clutch Unit

A new V-belt friction-drive clutch is announced by the V-Belt Clutch Co., 3757 Wilshire Blvd., Los Angeles 5, Calif. The Ball-lok clutch is designed to be used as either a driving or driven pulley. Clutching action is obtained by the grip of the pulley sidewalls against the belt.

One fixed flange of the V-belt sheave is an integrally attached part of the hub and the inner race of the sealed ball-bearing belt idler. Four free-rolling steel balls ride in grooves in the hub and carry all turning and locking forces. These balls are carried forward by the sliding clutch sleeve or movable flange, and drop into pockets at the ends of their grooves. The cam sleeve then moves over the clutch sleeve and locks the clutch against the balls in a driving or driven position. All parts turn with the shaft. A stop ring prevents over-travel of the cam sleeve in disengaging. When the clutch is opened, the belt

slackens and idles on ball bearings.

The present line contains four sizes: two may be applied to 3/4-inch shafts and two to 1-inch shafts. Sheave diameters vary from 3 1/4 to 5 inches. Lengths vary from 2 15/16 to 3 1/16 inches. Heavier-duty multi-belt units are planned with 4 1/2-inch pulleys and with bores up to 1 3/8 inches.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 22.

Multi-Purpose Loader

A tractor-mounted loader has been developed by the Loadrac Co., 8 So. Michigan Ave., Chicago 3, Ill. By means of special accessories, the Loadrac can be used as a shovel, bulldozer, snow plow, or crane. Built to fit most wheel tractors, it mounts on them and is attached to the rear axle and front mounting plate.

The Loadrac is a complete unit with built-in pump and valve. It uses its own frame as an oil reservoir. Power is obtained from a low-pressure gear pump driven by a splined shaft attached to a spline adapter which replaces the fan pulley.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 30.

Steel Fabrication Stopped

The Minneapolis-Moline Power Implement Co. has announced that, because of the heavy demand for its farm machinery, it is to discontinue fabrication of structural steel. The change will take place as soon as present orders are filled. At the present time, the company is operating two plants in Minneapolis, one in Hopkins, and one in Moline, Ill.



ASPHALT CUTTERS

MOIL POINTS

GADS

DIGGING CHISELS

Dallett's Contractor Tools

The utmost service can always be expected of Dallett Contractor Tools. They are made by Master Craftsmen of forged products, using the highest possible standards for quality.

Write for Bulletin C-220

TOOL MAKERS
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ACCESSORIES
SINCE 1883

THE DALLETT COMPANY
MASCHER AT LIPPINCOTT STREET, PHILADELPHIA 33, PA.
Manufacturers of Pneumatic Tools and Accessories
DISTRIBUTORS in principal cities throughout the United States, Canada, Europe and South America.

"Cemco" SECTIONAL CONVEYOR



Shovel hoppers of two yard capacity can be quickly and easily installed.

Adaptable FOR NEW USES at NEW LOCATIONS

A heavy duty conveyor, the Cemco will readily handle rock, sand, gravel, coal, lime, and ore. Available in both portable and stationary units, a combination of sections may be added to the head and tail to make up a desired length. Your choice of 18", 24", 30" widths.

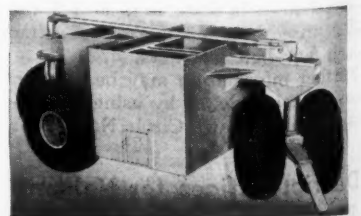
Perfectly balanced, the towing end can be easily raised and attached by one man. Standard pneumatic tires cushion the ride and make towing easy for a small truck.

Other features include: Hydraulic lifting system which is built into the A frame of the conveyor . . . 1-15/16" diameter jack shaft driven by an enclosed roller chain . . . triple braced lattice type frame . . . extra heavy troughing rolls . . . self-cleaning tail pulley . . . anti-friction pillow block and troughing roll bearings.

See Your Dealer or Write For Literature

AIRPLANE-TIRED ROAD ROLLER

The Cemco Flat-Iron Roller's five pneumatic tires provide a compaction path of 72" to 75". Its low center of gravity permits work on shoulders and otherwise inaccessible places, even when loaded with 128 cu. ft. of sand. It smooths as it packs.



"Cemco" INC

CONSTRUCTION EQUIPMENT and MANUFACTURING CO.
2430 University Avenue St. Paul 4, Minn.

ALSO MANUFACTURERS OF CEMCO HEAVY DUTY AGGREGATE ROLLERS

Cutting WIRE ROPE is easy

- FAST** Specially designed cutting blade and dies assures fast cutting action. The hammer principle eliminates any special skill requirements.
- CLEAN** Wire rope ends are cut smooth and clean for perfect threading or splicing.
- SAFE** The enclosed cutting blade locked in the body of the cutter assures perfect safety.
- PORTABLE** Models for tool kit or stationary operation. With cutting capacities up to: 1 inch, 1 1/16 inch, 1 1/2 inch.

the
MORSE-STARRETT
Way

SEE YOUR DEALER OR WRITE DEPT. "B"
MORSE-STARRETT PRODUCTS COMPANY
1204 - 49th AVENUE, OAKLAND 1, CALIFORNIA

Convention Calendar

Sept. 22-26—AASHO Meeting

Annual meeting, American Association of State Highway Officials, Waldorf-Astoria Hotel, New York City, N. Y. Hal H. Hale, Executive Secretary, 1220 National Press Bldg., Washington 4, D. C.

Oct. 6-10—Safety Congress

National Safety Congress, National Safety Council, Stevens, Congress, Sherman, and Palmer House Hotels, Chicago, Ill. R. L. Forney, General Secretary, 20 No. Wacker Drive, Chicago 6, Ill.

Nov. 4-7—Airport Show

National Airport Show and Institute, National Aeronautic Association and Air Foundation, Cleveland Municipal Auditorium, Cleveland, Ohio. Lowell Swenson, General Chairman, 400 Union Commerce Bldg., Cleveland, Ohio.

Nov. 10-13—Steel Institute

Annual convention, American Institute of Steel Construction, Inc., Roney Plaza Hotel, Miami Beach, Florida. Secretary, 101 Park Ave., New York, N. Y.

Jan. 26-28, 1948—ARBA Convention

Annual convention, American Road Builders' Association, Washington, D. C. President, J. T. Callaway.

July 16-24, 1948—ARBA Road Show

American Road Builders' Association Road Show, Soldier Field, Chicago. J. T. Callaway, President, ARBA.

Sand Pump Operates Without Stuffing Box

A centrifugal sand pump for use in pumping sand, cement slurries, and similar abrasive materials is made by A. R. Wilfley & Sons, Inc., P. O. Box 2330, Denver, Colo. A feature of these pumps is the elimination of the stuffing box.

The Wilfley seal consists of a revolving expeller said to keep the solution from leaking out while the pump is running. An automatic check valve seats around the shaft to prevent leakage when the pump is shut down.

The Model C sand pump is made in many sizes. All of them can be fur-

nished either as the belt-drive or the direct-connected type mounted on a sub-base with the Wilfley special flexible coupling. It is said that the three wear parts—case, runner, and follower plate—can be changed within 15 minutes by one man without disturbing the intake or discharge piping.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 29.

Amphibious Trailer

A portable camp trailer for use as a field shop or office has been announced by Higgins, Inc., Industrial Canal plant, New Orleans, La. Feature of this trailer is the fact that it is amphibious and therefore applicable to pier and other waterfront projects. Several trailer units coupled together can be used as a portable bridge.

The top panels of the trailer open outward to provide a usable space inside the trailer tent 12 feet 2 inches wide x 7 feet 6 inches long. With the

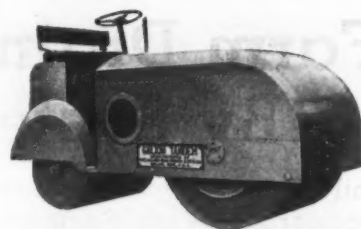
tent erected, there is a maximum headroom of 71 1/4 inches.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 42.

New 3 to 5-Ton Unit Added to Roller Line

The addition of a 3 to 5-ton tandem roller to its present line has been announced by the Galion Iron Works & Mfg. Co., Galion, Ohio. The tandem line now consists of four sizes: 3 to 5 tons, 5 to 8 tons, 8 to 12 tons, and 10 to 14 tons. All four sizes have the variable-weight feature.

Weight of the new unit varies from 7,120 pounds to a ballasted weight of 10,520 pounds. Fully ballasted, the compression under the main roll is listed as 170 pounds per inch of roll width, and 85 pounds under the steering roll. Both rolls are fitted with front and rear scrapers and mats. A 50-gallon water tank for sprinkling both rolls is pro-



This new Galion 3 to 5-ton tandem roller has a ballasted weight of 10,520 pounds, with compression under the main roll listed at 170 pounds per inch of roll width.

vided.

Automotive-type steering, forward and reverse motion controlled by a single lever, two speeds in each direction, and an unusually large-diameter main compression roll, are some of the other features listed for this unit. It is powered by a 4-cylinder, air-cooled 25-hp engine.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 1.



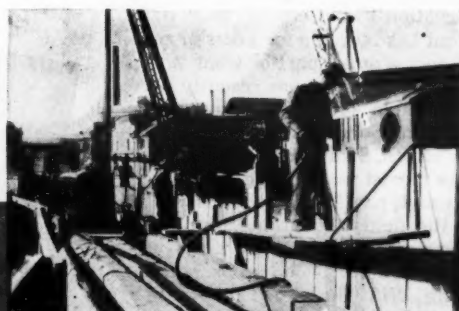
**IF THE JOB IS
IMPORTANT...
THEY SPECIFY SCHRAMM
ANY TIME
ANY WHERE**

Here you see 7 construction jobs being furnished compressed air by Schramm Air Compressors. Every one of the jobs is tough... but easily handled by Schramm, who furnishes all the air needed.

Throughout the country you will find Schramm Compressors used in construction work, specified because they are versatile, compact, lightweight. Schramm offers many advanced features. For full details write us today.



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**Simplifies
DIESEL
TROUBLE-
SHOOTING**

No single factor of Diesel operation is more important than compression pressure. That's why trouble-shooting begins with a check of compression of all cylinders. Model YUF Diesel Compression Tester illustrated has been designed to meet all field and shop needs for an instrument that can take hard use yet give reliable, accurate readings on any make of Diesel engine.

Attachment of tester is by means of interchangeable adapter which takes place of fuel injector. In addition to a "universal adapter" which serves more than 50 makes and types of Diesels, we have a complete line of special adapters for practically every commonly-used Diesel engine. Write for a copy of descriptive Leaflet 605.

ATTENTION! Distributors: Diesel equipment and accessory jobbers are invited to write for information about attractive distribution proposition.

BACHARACH INDUSTRIAL INSTRUMENT CO.
7000 BENNETT STREET, PITTSBURGH 8, PA.

Farm Drainage Aided By System of Ditches

Soil Conservation Districts Cooperate With Farmers To Put Into Production Land Idle for Years

† NOT all earth-moving jobs are big and spectacular. Yet some of the relatively small jobs, when measured by their importance to the common good, are more essential to the country as a whole than many larger and more dramatic projects. This is particularly true of earth-moving as planned and supervised by the Soil Conservation Service of the U. S. Department of Agriculture in the poorly drained farm-lands of some of our agricultural states.

Let us take a look at Louisiana, which is included along with the states of Texas, Oklahoma, and Arkansas in the Western Gulf Region of the Soil Conservation Service. In that state, land that has lain idle for years or produced only a small part of what it was capable of producing has recently been made suitable for crops through the efforts of the Soil Conservation Service. Under the SCS program, a lot of dirt is being moved as drainage ditches are dug through poorly drained farm acres. When the fields are drained properly, their owners can put them into production by planting food crops.

During 1946, the Soil Conservation Service helped farmers improve drainage on 53,646 acres in Louisiana; this was a sizable increase over the 13,411 acres which were drained there in the previous year. This year, with more equipment available, the acreage of improved drainage is expected to be even larger.

While drainage is only one item of soil-conservation work, it is basic and therefore probably foremost in importance. In its wake come the other features of conservation. They include conservation cropping systems to maintain or improve soil productivity, control of water erosion, woodland improvement and harvest cutting, proper management of crop residues, stocking cattle in accordance with the forage production of ranges, feeding range and pasture land, building stock ponds, forming diversion terraces, and other activities to stabilize the soil and improve its yield.

Soil Conservation Districts

The Pelican State is divided into twenty-four soil-conservation districts. This division is based on drainage and topographical features rather than on parish lines. A typical district, where drainage is the prime activity, is the East Carroll-Madison Soil Conservation District in the northeastern corner of the state, with headquarters at Tallulah in Madison Parish.

The District has five supervisors, three elected by the people and the other two appointed by the State Soil Conservation Committee. The Soil Conservation Service acts as a technical agency to assist these supervisors of the District in draining the land or other related work to help the farmers in that area.

A farmer needing assistance or advice applies to this board of supervisors which approves the application and forwards it to the Federal work units. At Tallulah the Soil Conservation Service office is headed by a District Conservationist who also works with three other near-by districts. On his staff at Tallulah is a work-unit conservationist and a work-unit engineer.

The farmers who are assisted by the Soil Conservation District may own anywhere from 40 acres up. They are eager to cooperate with the conserva-

tionists and engineers in their surveys and mapping by supplying rodmen or chainmen when necessary.

The first step in improving any individual farm is to help the farmer plan a system for draining the land according to the natural slope of the ground as much as is possible. Field surveys are made. Then the topography and contours are plotted on maps made from aerial surveys with a scale of about 1 inch equals 660 feet. From this information a system of land drainage is established.

Drainage System

The drainage system is simply a vast network of ditches which are carefully laid out and dug so as to carry the



Soil Conservation Service Photo

A lateral ditch is shown here under construction by a Caterpillar D7 tractor and a grader in the East Carroll-Madison Soil Conservation District, Louisiana.

water off the land into the nearest bayou or river. But the system must be planned to take into account the efficient use of equipment in farming the land. It must be planned so that it will not prevent the farmer from using

his mechanized 2-row or 4-row plowing, cultivating, or harvesting equipment. The fact that the farmer may not have such equipment in his barn right at the moment does not mean that

(Continued on next page)

FOOTE Kinetic mixer

- Handles any cold mix—fast!
- Capacity 3 cubic feet!
- An entirely new mixing principle!
- Thoroughly coats every particle of aggregate in seconds!
- Fully portable—easy to handle!
- High output with low equipment investment!

Builders of . . .

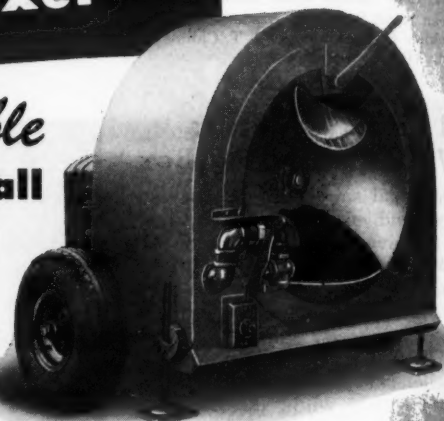
Adnun Black Top Pavers,
MultiFoote Concrete Pavers
and Foote Kinetic Mixers.

for profitable work on small asphalt jobs

NOW it is possible to do all sorts of small asphalt jobs—at a profit—with the Foote Kinetic Mixer! You take the asphalt plant to the job . . . mix fast and thoroughly . . .

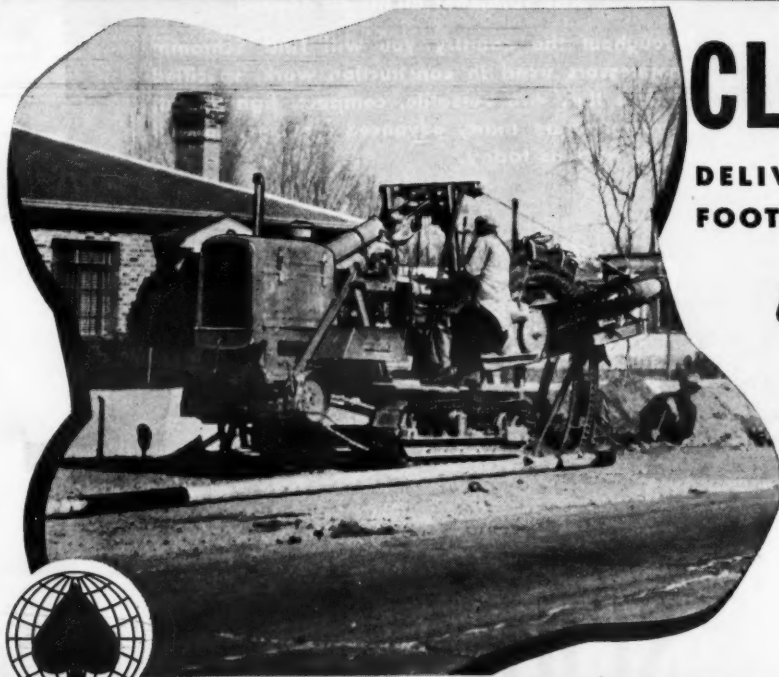
get high asphalt output with a low equipment investment. For the first time, contractors with limited capital can share in the profitable jobs requiring quantities of asphalt that cannot be prepared economically in a regular plant. Write for details on the new Foote Kinetic Mixer—and the entirely new mixing principle that makes it possible.

THE FOOTE COMPANY, INC.
1916 State Street, Nunda, New York



Also see page 31

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DELIVER MAXIMUM TRENCH
FOOTAGE AT MINIMUM COST

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OIL
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20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO

Farm Drainage Aided By System of Ditches

(Concluded on next page)

he will not have it in a few more years. If the ditches were dug so that they would be suitable only for the movements of a mule hitched to a moldboard plow, they would be obsolete if the farmer mechanized his equipment.

So a drainage system is developed based on an average $3\frac{1}{2}$ feet between crop rows. Run-off from the rows is drawn into cross drains, about a foot deep. These, in turn, empty into lateral ditches with a minimum depth of 2 feet to insure free discharge from the cross drains. The junctions of cross drains with laterals are staggered, usually 100 feet apart, to prevent silting.

The laterals may be from 400 to 800 feet apart, depending on the type of soil and topography of the land, and are parallel with the rows. The cross drains, of course, are perpendicular to the rows and laterals. All the cross drains are V-type, on an average of 4 to 1 slopes, with the excavated material blended back over the ground to eliminate any spoil banks. In this way the farmer's mechanized rolling equipment can operate smoothly over the flat ditch slopes without any interference.

The laterals empty into main ditches, usually about 3 feet or more in depth with 2 to 1 or 3 to 1 slopes. They are designed to take an overload of 20 per cent, and have an average fall of 0.2 foot per 1,000 feet. Under normal conditions they will drain all rain water from the fields within 24 hours. The main ditches usually drain into a canal or collection ditch, and from there into a bayou and thence to the Gulf of Mexico.

Complementary Work

Along with the drainage work, a farm-road system is laid out so that the farmer may reach any field without interference to the ditches. These roads are dirt, or dirt stabilized with gravel, and are 10 to 12 feet wide. They usually follow the field boundaries; in this way less arable land is consumed. Excess dirt from the ditches may be used in building up the roads for better drainage when they cross low areas. The roads are laid out on the large map which is given to the farmer.

On this map the conservationists also show in colors both the soil groups and the croppings over the farm. The entire area is analyzed for soil characteristics so that the farmer may have this information as a guide to his planting. A cropping system and rotation cycle is also developed for the use of the owner.

How It Is Done

Digging the network of ditches is obviously a job for construction equipment. For this work the District owns and operates a Lorain $\frac{3}{4}$ -yard dragline with a 40-foot boom and three pieces of Caterpillar equipment—a D7 tractor with a LaPlant-Choate 10-foot dozer blade, a No. 66 pulled grader with a 12-foot blade, and a No. 12 motor grader with a 12-foot blade.

Last year the State Legislature appropriated \$500,000 to assist the state supervisors in their district work of soil conservation. The East Carroll-Madison District received \$13,000 which was used for a down payment on the equipment.

The board of supervisors hires operators for the equipment, and has also engaged a maintenance superintendent on a full-time basis. The operators are paid by the hour when the equipment is working. The superintendent looks after the equipment, keeps it lubricated and in a good state of repair, and when it is on a job he sees that it is kept busy. He represents the supervisors of the

District, but works with the SCS conservationists and follows out their plans in the field.

This equipment is made available to the farmers on a per-hour rental basis which includes the services of an operator, fuel, oil, etc. The rate for the dragline is \$9 per hour, while that for the tractor and pulled grader, or the motor grader, is \$7.50 per hour. Statements of charges are sent to the farmers on the first and fifteenth of the month for payment. In this way the cost of the equipment is being liquidated. The individual land owner pays for the actual dirt-moving involved in the soil-conservation work done on his property. But the planning and supervision costs are defrayed by a combination of Federal and State assistance. In such a program it is the attitude of the SCS that it should do for the people only those things which should be done in the public interest but which the people cannot do for themselves.

Ownership of equipment by the Dis-

(Concluded on next page)

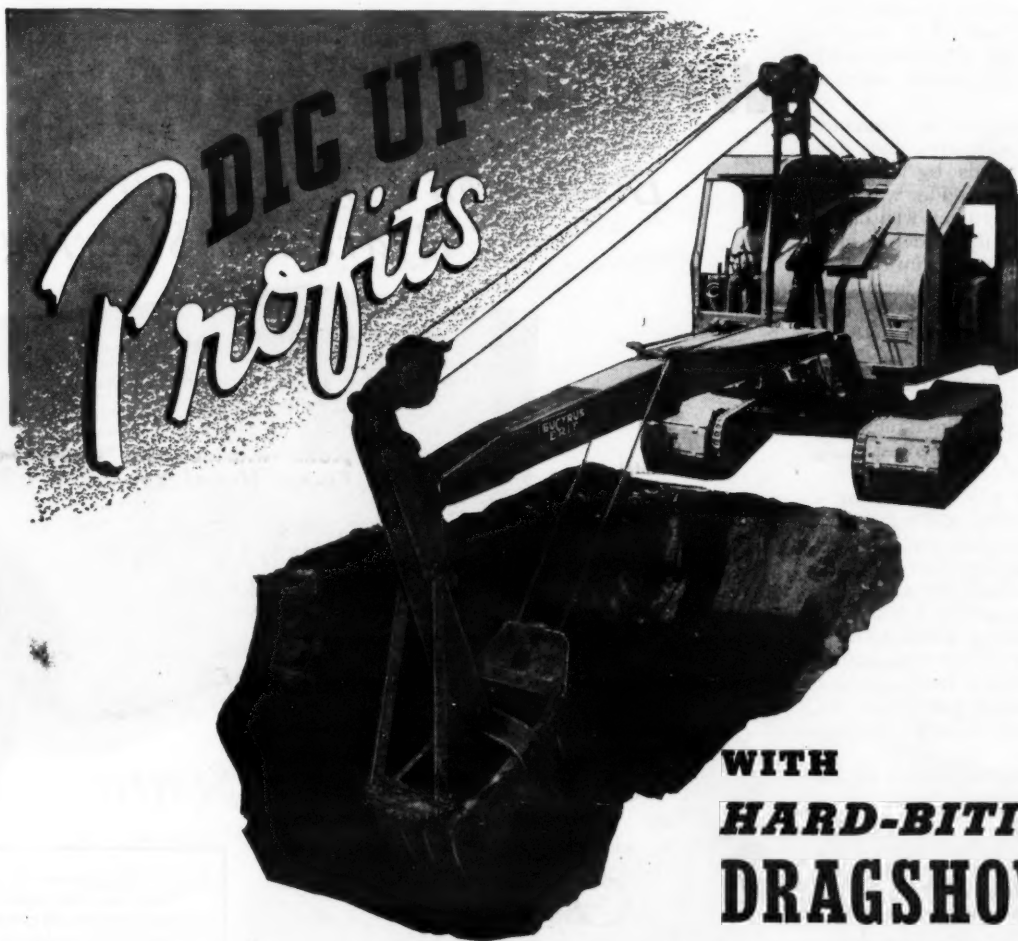
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for fast penetration, accurate digging and quick dumping. Arch and lip of 15-B and 22-B dippers are of a single, heat-treated casting, while the rest of the dipper is of streamlined, all-welded construction matching great strength with a front-to-rear taper for fast dumping and clearance in wide trench work.

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Farm Drainage Aided By System of Ditches

(Continued from preceding page)

tract really serves a dual purpose. Besides actually doing the work, it also serves to hold in line the prices that contractors are receiving for this type of operation. For there is so much soil-conservation work now under way or contemplated that a good deal of it is done by contract. Contractors are renting their equipment to the farmer's at hourly rates slightly higher than those charged by the District, but the supervisors are encouraging contractors to take over some projects and handle them as they would any dirt-moving contracts.

Contractors Help

In slack periods, or in between other jobs on the levees or in the oil fields, various contractors have done soil-conservation work for the farmers on a day or hour basis, or for a regular bid price. The latter method is usually employed when a big ditch has to be dug involving a considerable amount of earth work.

On a recent ditch job, for example, three contractors submitted bids for excavating 43,000 yards by dragline. The price of the lowest bidder was 14½ cents a yard, and payment was based on surveys taken by the Federal work unit. The unit also worked up a set of simple specifications for the farmer to give to the contractors before they bid. The chief requirement was that the work must be done by a dragline having a 40-foot boom to insure that the spoil banks would be thrown well back and not piled up beside the ditch.

Contractors have also been engaged on several so-called group jobs, where several farmers of adjoining or contiguous land required a long outlet ditch or canal to be dug for draining all the surrounding area into a bayou. The Soil Conservation Service helps here by getting the farmers together to agree on a plan for the group facility, and to advise them on the preparation of the contract. With a large yardage involved, the resulting bid prices are usually low. This benefits all the farmers concerned.

When the contractor is at work on the main job, the individual farmers generally make separate agreements with him to handle their other drainage work at the same time. Some of the contractors who have been engaged in this work with jobs ranging from \$1,000 to \$10,000 include: Ben Hawkins, Lake Village, Ark.; Cook Construction Co., Jackson, Miss.; Woody Farbanks, Jonesville, La.; Burnside & McDonald, Newellton, La.; and Foster & Childers, Wisner, La.

Maintenance

When the Soil Conservation Service turns over to the farmer a comprehensive plan showing what has been done to his farm, it strongly advises him to maintain the new ditches in order to keep the drainage system working. When 4-row equipment continually crosses the ditches, for instance, it may be necessary occasionally to run a plow through them, making a furrow and thus keeping them open. Natural grasses are grown on the side slopes for stabilization, but this growth must be cut to keep the ditches from becoming clogged and choked with weeds. Many farmers are buying medium-size tractor-dozers and graders for ditch maintenance, and are learning how to move the dirt out of the ditches and spread it across their fields to fill in low spots.

Putting Idle Acres to Work

The State Public Works Department

is also entering the land-conservation picture with a plan for a system of canals to drain more swampland along the bayous so that it may go into crop production. Over the years the bayous build up a ridge of silt and dirt along their banks which prevents the adjoining swamps from draining into the streams. Cutting canals from the bayous back into the swamps will enable the water to run off; the land will dry out and be available for farming. The land thus reclaimed will be rich in mineral elements containing potash, phosphate, lime, and nitrogen, which much of our eroded depleted soils now lack. By thus building up the soil, the conservationists will also build up the people.

The Tallulah, La., office of the U. S. Soil Conservation Service is headed by Don Richardson, District Conservationist, assisted by Robert W. Gandy, Jr., Work Unit Conservationist, and William Carter, Work Unit Engineer. The unit was established at Tallulah in February, 1945.

Rock-Crushing Units

Heavy primary crushing and grinding machinery for the reduction of rock products is now in production by the Process Machinery Division of Nordberg Mfg. Co., Chicago and Oklahoma Aves., Milwaukee 7, Wis.

Primary jaw crushers are available in feed-opening sizes from 30 x 42 inches to 72 x 96 inches; primary gyra-

tory crushers in sizes from 30 to 72-inch feed openings, and grinding mills from 6 feet to 10 feet 8 inches in diameter and up to 50 feet in length. Rotary driers, calciners, kilns, and coolers are included in the line. This equipment is in addition to the line of Symons Cone crushers made by Nordberg.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 10.

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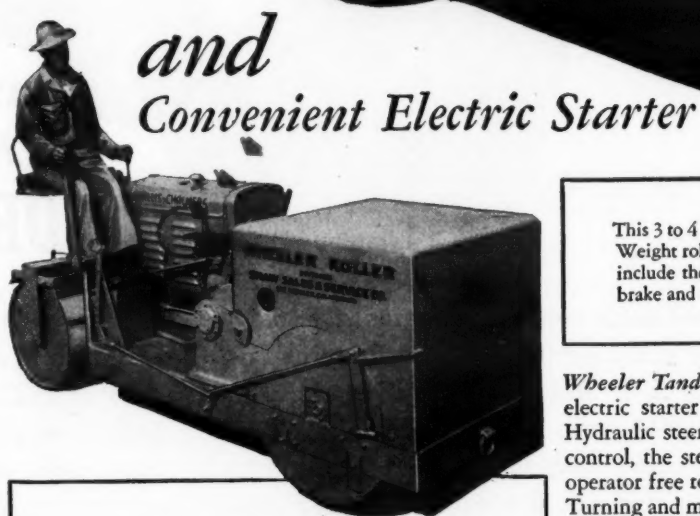
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POWER: Allis-Chalmers Industrial Model B. 24.5 Brake Horsepower @ 1500 RPM; 27.8 Brake Horsepower @ 1800 RPM. Speeds 2 forward and 2 reverse give 1.55 to 4 MPH range in either direction.

DIMENSIONS: Wheel Base 7' 10"; length overall 10' 7"; width overall 3' 6". Tank height 4' 0". Ground clearance 10". Left side clearance 1½".

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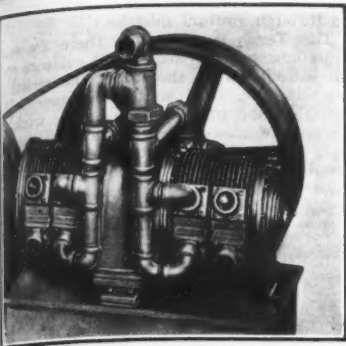
ELECTRIC STARTER AIDS OPERATION

The electric starter, now offered with the Wheeler Roller, simplifies starting and stopping. Idle running time is reduced and waste of fuel is minimized. Well within the operator's reach, the starter reduces the operator's labor and operating time.

NEW DEALERS are being added—Choice territories are still available

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The new Long oscillating compressor patented by Associated Engineers, Inc., is said to produce a large volume of air with a motor of comparably low horsepower operating at a low speed, and to eliminate noise and vibration. It will be made in all standard sizes.

New Compressor Cuts Noise and Vibration

A newly designed oscillating compressor which features only four major driving parts has been patented and announced by Associated Engineers, Inc., Las Vegas, Nev. It is claimed that due to the new design, drive, and balance, noise and vibration have been eliminated.

The bore in the first working model is 10 inches in diameter by 9 inches deep. Each cylinder is divided into four compartments by means of two stationary vanes and one oscillating rotor fixed to the rotor shaft. At every revolution of the crankshaft, eight power outputs are produced, the equivalent of the displacement of both cylinders. It is stated that at 235 rpm, the compressor has an output of approximately 500 cfm of free air at room temperature, and 300 cfm at 92-pound pressure.

Power was provided for the first test of the model by a 20-hp three-phase 220-volt electric motor. Total weight of the unit is 350 pounds. Production plans call for the Long oscillating compressor to be produced in all standard sizes.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 28.

New Cabinet-Model Flexible-Shaft Unit

A cabinet-model flexible shaft has been added to its line of equipment by Wyzenbeek & Staff, Inc., 838 W. Hubbard St., Chicago 22, Ill. Known as the Streamflex, it features the Wyco locking shaft holder, said to hold the shaft and grinding wheel securely in position for stationary grinding.

All belts and pulleys are enclosed in the streamlined cabinet. The cover slides up for changing belts or adjusting speeds. Standard equipment includes the Wyco flexible shaft with the Wyco non-metallic innerliner, handpiece, a 6-inch grinding wheel, wheel arbor, and a steel wheelguard with outboard handle.

Five models are available: 1/2 hp with speeds of 1,400, 2,400, and 4,500 rpm; 3/4 hp with speeds of 1,800 and 3,600 rpm; 1 hp with 3,600 and 6,000 rpm speeds; 1 hp with 1,800 and 3,600 rpm; and 1 hp with speeds of 3,600 and 6,000 rpm.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 40.

Locomotive Crane

A new Dieselectric locomotive crane having a capacity of 40 tons has been announced by the American Hoist & Derrick Co., Robert & Waters Sts., St. Paul, Minn. The crane uses electricity to move it along the rails, and diesel power to operate the turntable and lifting mechanism. According to the manufacturer, electrified drive provides smoother starts, eliminates scores of moving parts, and reduces maintenance

costs. This American Dieselectric can be equipped with a powerful electromagnet. Its feature is that power from the traction generator is used for energizing the magnet.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 94.

Ky. Appoints Landscaper

The Kentucky Department of Highways has appointed John P. Shannon as engineer in charge of roadside improvement and erosion control. His duties will include establishing and maintaining roadside parks and picnic areas, bank and drainage protection, and roadside planting.

Mr. Shannon was formerly connected with the Tennessee Valley Authority and also the Public Recreation Commission of the City of Cincinnati. He holds a degree in Landscape Architecture from the University of Cincinnati.

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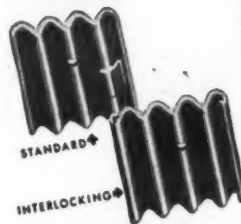


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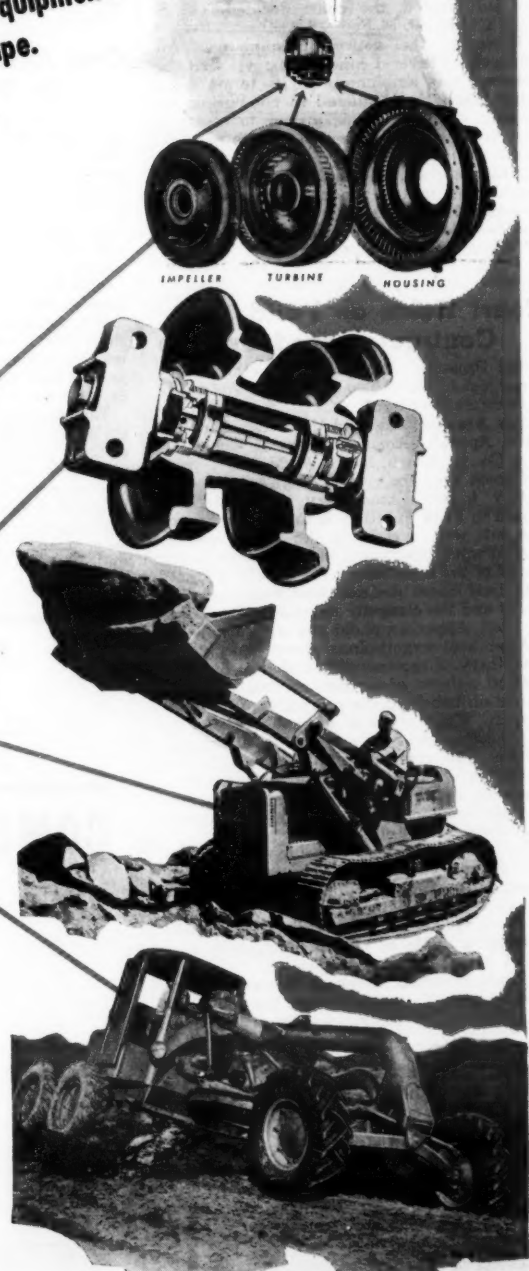
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Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Renegotiation Affects

Employee's Commission

THE PROBLEM: A Federal contractor agreed to pay a superintendent a stated salary and 10 per cent of the net profits of Government jobs when "full settlement" should be received by the contractor from the Government. The agreement defined "net profits" as "the difference between the contractor's price and the total cost of labor, materials, subcontracts, insurance and social security taxes, and . . . all licenses, permits, and taxes to be paid from this project except the United States Federal Income Tax only," etc.

The work was completed by November, 1942, and was accepted by the Government. The full contract price was paid, showing a profit of \$4,000,000. In the meantime, the Federal Renegotiation Act became effective, April 28, 1942. And under that act, the Government demanded that the contractor repay \$1,365,000. Proceedings have been pending ever since the contract price was paid.

The superintendent claimed that these proceedings did not affect his right to the agreed commission on the profits shown by the settlement made when the job was completed. He sued to recover on that basis.

Has the contractor a right to have the suit abated until the renegotiation proceedings are concluded? He claimed that the commission must be computed upon the profit shown after he has paid the Government whatever sum ultimately may be adjudged due under the renegotiation proceedings.

THE ANSWER: Yes, he has a right to have the suit abated, the court decided. (U. S. Dist. Ct., Minn. 66 Fed. 2d 436.)

However, the court's opinion was influenced by several conclusions: (1) that the contract was ambiguous in its terms as to what should be deducted in computing net profits; (2) that it was proper to resort to the circumstances under which the employment contract was made to solve the ambiguity; and (3) that those circumstances established mutual understanding that the commission was to be computed upon the contractor's profit shown after termination of the renegotiation proceedings.

Court Holds as Valid

Contract Signed by One

THE PROBLEM: Is it possible for an agreement signed by only one party to constitute a "written" contract?

THE ANSWER: Yes, said the Texas Court of Civil Appeals, Amarillo. (Taylor Construction Co. v. Clynn, 196 S. W. 2d 700.)

Clynn sued the construction company for injury to road machinery which he had leased to it. A question as to whether or not the suit was brought in the proper county turned upon this point: was the contract for rental of the machinery a "written" contract? The trial court decided that point affirmatively and the company appealed. The Court of Civil Appeals upheld the decision.

After oral negotiations about renting the machinery, a representative of the company drafted a form of written contract. It was signed on behalf of the company and sent to Clynn. Clynn made some alterations in the wording and returned it without his signature. The company orally agreed to the changes and promised to embody them in a new document to be signed by both parties. But this was not done and the altered agreement was carried out.

The company's lawyers contended that no written contract resulted because (1) both parties did not sign, and (2) the original document was nullified through material alterations made in its wording by Clynn. Dismissing both of these contentions, the Court of Civil Appeals said:

"When a contract between two parties has been reduced to writing, bears the signature of either of the parties, and is ratified and

accepted by both parties, it is treated as a written instrument and is binding on both parties."

As to alteration by one of the parties of a contract not legally required to be in writing, the court said: "A material alteration of a contract already made may be subsequently ratified and adopted and . . . such instruments as altered will be binding upon both parties. It is not necessary that the ratification of the alteration be in writing . . . but the same may be ratified by oral agreement or by circumstances, acts, and conduct, with full knowledge of the facts, on the part of the party affected. The instrument [as changed] is valid if the intention of the party to recognize its validity is sufficiently shown. Acquiescence without objections to the alteration, with knowledge of the facts, until enforcement of the instrument is sought may constitute ratification. Acquiescence may constitute ratification if a party, with knowledge of the alterations, accepts the benefits according to the terms of the altered instrument and such party may be estopped from denying liability of the same."

A COMMENT: The Texas decision affords reliance to one who has neglected to insist upon execution of a contract by both parties, embodying the altered agreement. But, obviously, there should be such insistence. It is a means of guarding against the other party's denial that he orally agreed to the suggested alterations. And it guards against litigation as to the sufficiency of an oral modification of a written contract under the circumstances of the particular case.

Oral Agreement Adds

To Written Subcontract

THE PROBLEM: A subcontract required that the subcontractors carry certain insurance. But it did not specify the company or companies in which the insurance should be written. On a settlement of accounts, the general contractor sought to charge the subcontractors with a \$450 loss resulting to him. His grounds were that the insurance was not secured from a certain company which would have granted him "some sort of rebate on the premium."

Did the general contractor have a right to show that when the written subcontract was made, it was orally agreed between the parties that the insurance would be written in a certain company?

THE ANSWER: No. (Quinn v. Wilkerson, 195 S. W. 2d 399, decided by the Texas Court of Civil Appeals, Ft. Worth.) The court applied this general rule of law: where a written agreement appears to cover all of the terms intended to be binding upon either party, neither party has a right to enlarge or contradict the contract by claiming that there was a previous or contemporaneous

understanding not embodied in the writing. (Of course, this does not mean that a written contract cannot be modified by oral agreement after it has been entered into. It can, provided there is no statute requiring modifications to be in writing. Nor does it prevent either party from showing that a certain provision was to have been incorporated into the writing, but that the provision was omitted through fraud of the other party

or through mutual mistake.)

The Texas court said: "There are some situations where oral evidence may be introduced to show that the recital of consideration in a written instrument [for example, the price to be paid for work] is inaccurate. . . . But we do not have such a case here. The excluded testimony . . . would establish a oral contract which adds

(Continued on next page)



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Avoid Legal Pitfalls

(Continued from preceding page)
to the burdens of the written contract between the parties. We would then have a case where the written contract purports to cover the agreement of the parties about insurance to be covered by . . . the subcontractors, "and also a contemporaneous oral contract imposing upon . . . them "additional requirements concerning the same subject matter."

Highway Work Subject To Federal Labor Laws

THE PROBLEM: Was a construction company subject to the wage and hour provisions of the Federal Fair Labor Standards Act? The company's employees were engaged in work on roads, streets, and bridges used in interstate commerce; in constructing conduits for telephone lines carrying interstate calls; and in constructing buildings, etc., used by railroads and industrial plants engaged in interstate commerce.

THE ANSWER: Yes, said the United States Circuit Court of Appeals, Third Circuit. (Walling v. McCrady Construction Co., 156 Fed. 2d, 932), affirming a decision of the United States District Court, Western District of Pennsylvania, 60 Fed. Supp. 243.

The court rejected a contention that highway contractors are alter egos of the Government. It rejected an argument that the history of Federal legislation does not affirmatively disclose a purpose to bring labor on highways, etc., within the wage and hour provisions. The court noted that the United States Supreme Court has declared: "Vehicular roads and bridges are as indispensable to the interstate movement of persons and goods as railroad tracks and bridges are to interstate transportation by rail."

The decision was also influenced by the fact that the roads and streets involved were in the Pittsburgh area and "indispensable to the continuance of production of goods moving in interstate commerce," etc.

Unlicensed Contractor Is Entitled to Pay for Work

THE PROBLEM: Could an excavating subcontractor recover pay from the prime contractor on a Government job where he had not been licensed to do business in the state but the prime contractor had been so licensed?

THE ANSWER: Yes. (Dow v. United States, 154 Fed. 2d 707, decided by the United States Circuit Court of Appeals, Tenth Circuit, affirming a decision of the United States District Court for Utah.)

The case turned upon a Utah statute which provides for the licensing of contractors. The Court of Appeals cites decisions of the United States Supreme Court and of appellate courts of states including Utah, Michigan, Wisconsin, Washington, New York, Virginia, Kentucky, and Oklahoma, in support of its conclusions as follows:

"Neither of these statutory provisions [the

Utah licensing statutes] nor any others called to our attention provide in express language that a contract employing an unlicensed contractor to perform services falling within the field of his trade shall be unenforceable. But the statutory requirement to obtain a license before engaging in the trade is a police regulation for the protection of the public; . . . a penalty is provided for the violation of the statutory exaction; and it is the well settled general rule that in ordinary circumstances, a contract entered into by an unlicensed person in contravention of the statutory provisions of this kind will not be enforced. . . .

"But that general rule does not have application in a case of this kind in which an unlicensed member of a profession or trade seeks to recover from a licensed member for services rendered or labor performed pursuant to a contract entered into by them. . . . Moreover, here the primary contract obligated Dow [the prime contractor] to construct the buildings, including the excavating for the footings. He could do all of the work himself or let some of it to sub-

contractors. The subcontract let to Holley was illegal [because he was not licensed] but he has completed the work under it. The prime contract also has been completed, and Dow has received from the United States payment in full . . . including the amount attributable under such contract to the excavating. . . . Both contracts having been completed and Dow having received payment in full, it would not further the letter or the spirit of the law to allow him to escape liability for the unpaid balance due Holley by asserting the illegality of the subcontract."

A General Contractor Loses to Subcontractor

THE PROBLEM: The engineer on a Federal project wrongfully condemned bricks used on a construction job. So the general contractor required the subcontractor who had installed them to tear them out and furnish better and more expensive brick than called for by the specifications. Was the subcontractor entitled to damages against the general contractor and its surety for resulting losses?

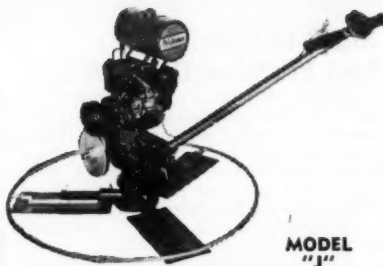
THE ANSWER: Yes, said the United States Circuit Court of Appeals (John A. Johnson & Sons, Inc., v. United States, 153 Fed. 2d (Concluded on next page))

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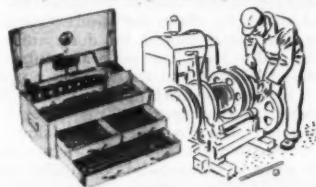
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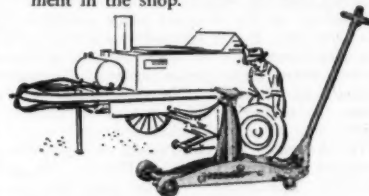
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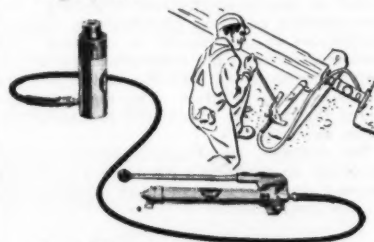


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BLACKHAWK

Avoid Legal Pitfalls

(Continued from preceding page)

534), upholding a judgement of the United States District Court for the District of Maryland.

The general contractor tried to escape liability on the ground that the subcontract imposed upon the subcontractor the same obligation to the general contractor that the latter owed the Government, with respect to rulings of the engineer, etc. The court held against the general contractor. The reason for this holding was that the brick had been rejected, not in conformity to provisions of the principal contract but in violation of those provisions.

Nor was the subcontractor's claim for damages precluded by certain clauses of the subcontract. These clauses declared that he should make no claim for additional work unless the same should be done under a written order from the general contractor; and they also declared that claims not presented before the next payment should be considered as abandoned.

The court said that these provisions related to "extra work, that is, work not within the express or reasonably implied scope of the specifications agreed upon at the time that the two contracts were made".

The Right of an Owner

To Terminate a Contract

PROBLEM 1: A construction contract was so worded that the owner was bound to pay installments of the contract price certified by his architect. But it was also so worded that the contractor had no right to quit without giving seven days' notice after the owner's default in payment. He quit immediately when the owner failed to pay a certified installment. Who broke the contract?

THE ANSWER: The contractor, said the Connecticut Supreme Court of Errors. (48 Atl. 2d 375.) The court reasoned that the contractor could have put the blame upon the owner had he given the notice he had agreed to give in that situation. But that agreement suspended his right to quit work because of the owner's default in payment until expiration of a seven-day notice.

PROBLEM 2: The contract also provided that the owner could terminate the contract if the architect certified that the contractor had failed to pay subcontractors promptly. But the contract gave the contractor a right to arbitration of the dispute on demand. The architect certified the contractor's failure to pay subcontractors, but the contractor did not ask for arbitration. The owner terminated the contract. Could the contractor recover any pay?

THE ANSWER: No. Finishing the work and securing an architect's certificate as to the amount due was a prerequisite to collection by the contractor.

Dispute Decision Invalid For Wrong Officer Made It

THE PROBLEM: A Government construction contract required that disputes arising under it be settled by the Government's contracting officer. When it came to a question of the right of the contractor's surety to an extension of time for performance, the contracting officer passed the buck to the Comptroller General. The latter denied a time extension. He thereby made surety liable for damages for delayed performance. Was his ruling binding upon the surety?

THE ANSWER: No, according to the United States Court of Claims. (United States Casualty Co. v. United States, 67 Fed. Supp. 950.) The Court of Claims said: "The contracting officer apparently was reluctant to assess liquidated damages against the plaintiff (the contractor's surety). But after consulting with his lawyers he was doubtful of his legal authority to waive the assessment,

and consequently ducked the issue by referring it to an agency which had no authority whatever in the premises. In all of these circumstances, we do not feel that his decision, in the form in which it was presented in this case, constituted either a final decision or final action on the question of delay."

Uncle Sam Misstated Established Wage Rate

THE PROBLEM: The successful bidder on a Federal construction job underestimated the cost of bricklaying. He did so because the bidding spec stated that the Secretary of Labor had determined that the prevailing hourly wage rate was \$1.50. The rate had, in fact, been determined to be \$1.75. As contractor, was the bidder entitled to collect from the Government on account of being required to pay the higher rate?

THE ANSWER: Yes, said the United States Court of Claims. (Albert & Harrison v. United States, 68 Fed. Supp. 732.) The fact that the bidding spec may have been prepared before the wage rate was increased did not defeat the contractor's right to correspondingly increased pay, in view of the fact that the rate was increased "some weeks before the contract was made", without the contractor being informed as to the change.

The court said: "We recognize, of course, that the statute [which requires that wages paid shall not be less than those determined by the Secretary] requires the payment of the determined rate as a minimum, and does not forbid the payment of a higher rate. But the rate determined to be the prevailing rate is, by hypothesis, the rate customarily paid, and the rate at which a contractor could expect to hire his labor."

No Right to Overhead And Profit on Extra Work

THE PROBLEM: The Government directed a contractor to substitute ceramic-glazed tile for salt-glazed tile on a construction job. The contractor protested to the Government. But he induced subcontractors to substitute the more expensive tile, and promised to pay them "the additional difference in cost between the salt-glazed wall units . . . and the ceramic-glazed wall units".

Were the subcontractors entitled to add to the difference in cost 10 per cent as profit

and 10 per cent as overhead?

THE ANSWER: No, said the United States Circuit Court of Appeals, Eighth Circuit. (United States v. Henke Construction Co., 157 Fed. 2d 13.) The contractor's promise was to pay to the subcontractors only the difference in the cost of the substituted material. There was nothing to show that the substitution entailed any extra or additional work over what would have been entailed in installing salt-glazed tile.

Rejected Bidder Sues

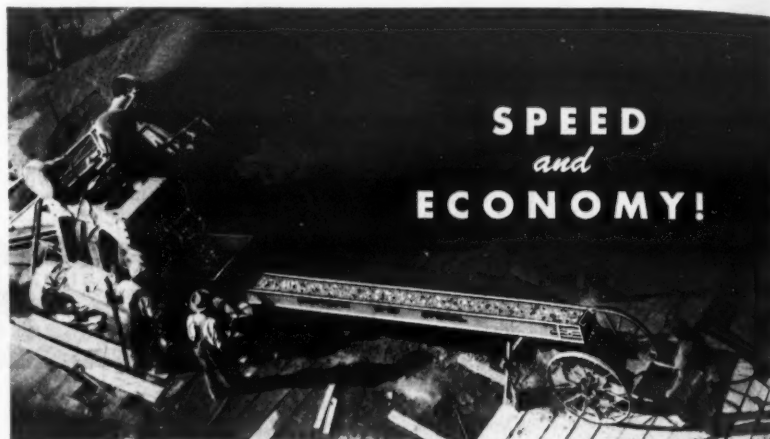
THE PROBLEM: An unsuccessful bidder on a city paving job sued to review action of the municipal authorities in rejecting the bid. He did not, however, show that his bid was lower than that of the successful bidder, or that he was a taxpayer. Did he have the

right to sue under those circumstances?

THE ANSWER: No, according to the New Jersey Supreme Court. (Kingston Bituminous Products Co. v. Board of Commissioners, City of Trenton, 48 Atl. 2d 197.) The court decided:

It is well settled law that the right of an unsuccessful bidder to sue as such "rests upon his right to have his bid accepted". No one can sue in such a case unless he has some "personal or property interest to be specially and immediately affected" by the municipal action complained of.

A mere statement that the taxpayers would have been saved 20 per cent on the cost if the complaining bidder had been awarded the job, was a mere statement of opinion. It was not a substitute for distinct allegation and proof that the rejected bid was lower than the accepted one.



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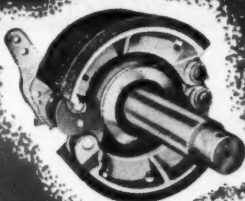
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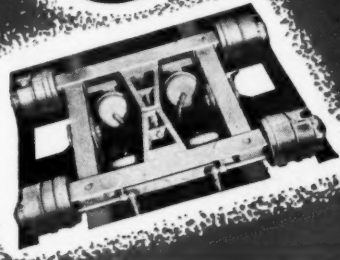
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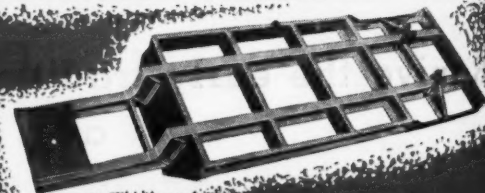
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C. & E. M. Photo

The Marion crane picks up a 57-foot 21-inch-diameter octagonal pile with a double sling to fit it into the leads for driving on the Santee River bridge.

Piles Cast, Driven For Trestle Bridge

Subcontractor Sets Up Yard on Site to Handle 361 Concrete Octagonal Piles, 57 Feet Long

(Photo on page 1)

A NEW bridge is under construction over the Santee River on State Route 511 near Jamestown in the eastern part of South Carolina. Heretofore the only way to get across the river at this point has been by ferry. But since the development of the big Santee-Cooper hydroelectric station upstream, the river flow has been so regulated that the ferry has not always had enough water in which to operate. This situation compelled motorists to use either of the paralleling north-south routes, U. S. 17 to the east or U. S. 52 to the west. Each is from 20 to 30 miles distant.

Two contracts are now under way on the project. One has been awarded to the McMeekin Construction Co., of Cheraw, S.C., on its low bid of \$112,727.42 to construct eight concrete piers for the main river spans. The other contract has been awarded to F. A. Triplett of Chester, S.C. It includes precast concrete-pile bents with 40 and 41-foot reinforced-concrete deck spans. These concrete trestles on either side of the river serve as approaches to the main crossing.

In the latter contract the work of casting and driving the piles was sublet to the Boney Construction Co., of Norfolk Va. Operations on this phase of the job were started in July, 1946. By April of this year the 361 reinforced-concrete piles with the 21-inch-diameter octagonal cross section had all been cast; and the driving was completed by June 1.

Tapering at their ends, the piles driven on the left bank of the Santee (looking downstream) measure a uniform length of 57 feet and weigh 10.5 tons. Those driven on the right bank are shorter and of mixed length, according to topographic conditions, with an average length of 40 feet. On the left bank 272 piles were cast and driven, and 89 on the opposite side.

Batch Plant

The batch plant for right-bank piles was set up at a siding on the Seaboard Air Line Railroad located about a mile from the beginning of the new bridge.

Because of the greater amount of work on the left bank, a batch plant was also set up on this side near the Dorlen station of the Seaboard Railroad about 3/4 mile from the end of the new structure, which will be 3,889 feet long.

At the left-bank plant, sand and stone were stockpiled on either side of a Heltzel bin. It had been enlarged

by the contractor to a capacity of 100 tons for its two compartments. The bin was kept charged by a Bucyrus-Erie coal-burning steam crane equipped with a 50-foot boom and a Williams 3/4-yard clamshell bucket. Aggregate was weighed on a Kron dial scale before dumping into the batch trucks which backed under the hopper for their loads.

Sand was obtained from the Becker County Sand & Gravel Co., at Gresham, S.C., while stone was taken from a quarry at Rion, S.C. Both the fine and coarse aggregate came to the Seaboard siding in gondola cars. They were unloaded by the crane working from a timber crib. Two Ford trucks, holding three 2-bag batches each, hauled the aggregate to the mixer at the casting yard where bag cement was added.

Penn-Dixie cement was used, shipped from Clinchfield, Ga., by rail to the plant. The reinforcing steel was also shipped by rail to the site from the Virginia Steel Co., Inc., Richmond, Va.

(Continued on next page)



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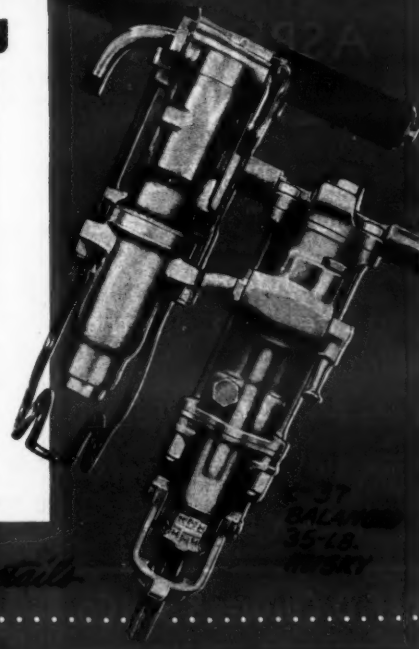
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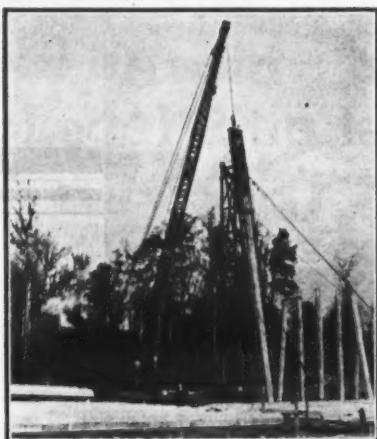
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C. & E. M. Photo

This Marion crane with an 85-foot boom, driven by a 60-hp oil-burning boiler, drives a batter pile for the Santee River bridge with a Vulcan No. 0 hammer in 57-foot steel leads.

Piles Cast, Driven For Trestle Bridge

(Continued from preceding page)

A typical batch, dry weights, included:

Cement (2 bags)	188 pounds
Sand	360 pounds
Stone	680 pounds

Pile-Casting Yard

The piles were cast on the bridge site, as close as possible to where they were to be driven in order to save re-handling or moving. This was not altogether possible, however, for the ground is low along the left bank and subject to flooding. So those piles closest to the river were cast back on higher ground and later moved to position by the driver or loaded on sleds and snaked forward by a tractor. On the left bank 12 beds were constructed for casting; on the right bank 9 were built. The beds measured 58 x 31 feet and were large enough for 10 piles each.

Being unable to obtain the desired steel forms for casting the 21-inch-diameter octagonal piles, the contractor used wood throughout, mostly pine with some cypress. As a foundation, 1 x 4 or 2 x 4 stakes, 3 to 5 feet long, were driven nearly flush with the ground on 22-inch centers longitudinally and 18-inch centers transversely.

For each bed 800 such stakes were required. These were connected with 2 x 4 stringers with butt joints to support the bottom of the pile form, a single 1 1/4 x 8 3/4-inch board. The side forms were also 1 1/4-inch stock, with the top left open to admit the concrete.

Side bracing consisted of 2 x 10 battens, cut to shape and spaced on 2-foot centers. Running lengthwise along the bottom on each side were 1 x 4 kickers nailed to the stringers. Necessary adjustments for alignment were made by inserting wedges between the battens and the kicker. Across the top, 1 x 4's laid flat were nailed, tying the forms together as they were aligned. Around the outside of the bed were 1 x 4 braces on 3-foot centers, with one end fastened to 1 x 4 stakes in the ground. The bulk of the form cutting was done on a table saw which had an 18-inch-diameter blade driven by a Wisconsin gas engine.

The steel reinforcing cages were assembled on wooden horses and then slid into the forms through an opening at the end. This was then closed by a



C. & E. M. Photo

Looking towards the Santee River, we see some of the bridge piles already driven with the driver rig and casting yard beyond.

wooden bulkhead. The steel was suspended by heavy wire on 1/2-inch hook bolts.

Batches were mixed in a Rex 10-S mixer on the left bank, and a Koehring (Concluded on next page)

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Piles Cast, Driven For Trestle Bridge

(Continued from preceding page)

14-S on the right bank. Water for the concrete was obtained from two well-points, 10 feet x 1 1/4 inches, driven 15 feet in the ground. The pumping was done by a C.H. & E. 4-inch pump. The mixed concrete was transported to the forms by hand labor, using Jackson rubber-tired concrete buggies holding 1/6 yard. The concrete was dumped into the well oiled forms and vibrated with Mall vibrators; there were four of these on the job. Wet burlap was used for curing.

Driving the Piles

The pile-driving rig consisted of a Marion 37 crane with an 85-foot boom. It was driven by a 60-hp oil-burning boiler contained within the unit. A Vulcan No. 0 hammer with a 22-foot frame was used in 57-foot steel leads. Since the 5-pile bents called for the three interior piles to be plumb and the two outer piles to be battered, a dual steel lead was employed; one side was plumb and the other battered 1 1/2 inches to the foot. One pile is on the bridge center line, the adjacent plumb piles are 6 feet 6 1/2 inches from the center line, while the batter piles measure 12 feet 1 1/2 inches from the center line at cut-off elevation.

A template was made of 12 x 12-inch timbers with 21-inch square openings into which the piles were framed for accurate driving. The driving rig picked up the piles with a 2-wire sling and set them in the template opening. One of the batter piles was driven first. Then the leads were lifted and placed cross-wise of the template, and the next two plumb piles were driven in order. Next the other batter pile was driven, followed by the remaining plumb pile in the bent.

A jet was used on the driver with water pumped either from the river or from the neighboring swamp by a Goulds 4-inch pump. About 20 minutes of hammer work was usually required to drive the piles to cut-off elevation with the required bearing.

To give added rigidity to the structure, certain bents at designed intervals have seven instead of five piles; the two extra piles are driven between the outside batter piles and the adjacent plumb piles. These supplementary piles were driven on a batter of 3 inches in 12, and both slope in the same direction. The adjoining bent is also a 7-pile bent; the two added piles are battered in the opposite direction but also in line with the longitudinal axis of the bridge. Reinforcing steel projects from the caps into each end of the 40-foot span resting on the bents, thus making a rigid frame which provides longitudinal rigidity. The pair of 7-pile bents are known as tower bents.

Quantities and Personnel

The two major items which were part of the subcontract for casting and driving the concrete piles included the following:

Reinforcing steel	520,000 lbs.
Concrete	1,745 cu. yds.

An average force of 35 men was employed on this phase of the project. Of these 9 made up the pile-driving crew and the rest handled the steel setting and the concrete. T. C. Carr was Superintendent for the Boney Construction Co., and Robert S. Hills was Resident Engineer for the South Carolina State Highway Department which is headed by J. S. Williamson, Chief Highway Commissioner. C. R. McMillan is State Highway Engineer and W. J. Gooding, Jr., is Bridge Engineer.

The prime contractor is constructing

30-inch square caps, 27 feet 8 inches long, of reinforced concrete into which the piles will protrude 2 1/2 inches. This will then be followed by the deck construction.

Loader for Tractors

A tractor-mounted front-end mechanical loader has been announced by Coats Loaders & Stackers, Inc., Fort Dodge, Iowa. Attachments available include shovel, dozer blade, snow bucket, and gravel or dirt bucket. The Model B unit has a low clearance of 6 feet and will lift loads to a 9 1/2-foot clearance under the bucket.

The lifting assembly is complete in one unit. A belt pulley drive activates the shaft of the cable drum by means of a No. 55 steel chain. Load capacity is 2,000 pounds. An automatic brake is said to stop and hold the load at any level.

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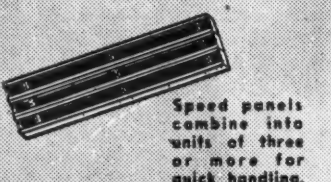
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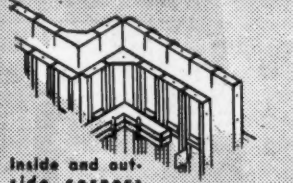
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Utility Compressor Is Light in Weight

A new lightweight air compressor has been announced by the Le Roi Co., 1706 So. 68th St., Milwaukee 14, Wis. Known as the 105 utility, the new Air-master has a total weight of 1,700 pounds and requires a floor area of 82 x 25 inches.

Power is furnished by a Le Roi D226 engine. The liquid-cooled compressor is built integrally into the engine block. It is regulated by the Le Roi Econotrol which is said to govern compressor capacity automatically according to the demand for air. A lifting bail, 6-volt electric starting system, and an hour-meter are supplied as standard equipment.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 2.

Circular Slide Rule

A circular slide rule has been announced by the Tavella Sales Co., 25 W. Broadway, New York 7, N. Y. Mathematical functions which can be performed on this slide rule are multiplication, division, proportions, trigonometric functions, logarithms, exponential equations, square and cube roots and powers, and extraction of any root or power on the log log scales. It is 9½ inches in diameter with a C scale equivalent to 25 inches in length.

The Dialog slide rule is made on white Vinylite with graduations impressed by mechanical means. There are twelve scales on the face of the rule, and readings can be transferred from one scale to another without reversing the rule. The manufacturer claims that the arrangement of the calibrations and numerals permits rapid and easy reading of the scales.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 34.

Roller Pipe Support

A new design in roller pipe supports has been developed by the Unistrut Products Co., 1013 W. Washington Blvd., Chicago 7, Ill. Feature of these supports is the fact that by changing the length of the axle, the same rollers can be used for any pipe having an outside diameter of from 1 to 12 inches.

According to the manufacturer these roller pipe supports will carry up to 3,000 pounds per unit with an ample safety factor. The conventional screw adjustments are made unnecessary by using these roller assemblies with adjustable Unistrut framing.

The Unistrut supports can also be used in an inverted position to prevent the jumping effect caused by rapidly changing pressures.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 45.

Bulk-Cement Conveying

A bulletin issued by the Fuller Co., Catasauqua, Pa., illustrates and describes the use of Fuller equipment for handling bulk cement. It contains drawings and photographs which show typical installations of the equipment in use for conveying bulk cement from railroad car or barge to mixing plant.

Bulletin FK-20 describes the Fuller-Kinyon pump, the Type C remote-control unloader, the Type D unloader, the remote-control switch, the Fuller-Fluxo pneumatic conveying system for long distances, and other component equipment.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 54.

Heavy-Duty Trailer Line

A line of heavy-duty trailers is described in bulletins issued by the Easton Car & Construction Co., 50 Church St., New York 7, N. Y. The Model TR

trailers range in capacity from 10 to 20 tons and larger. The bulletins describe the features of these trailers, including the Phoenix pan-type side-dump body.

Bulletin No. 173-A describes the TR-10; No. 174 describes the TR-13; and No. 175-A describes the 20-ton Model TR-15. Bulletin No. 205 gives details on the trailer design, and No. 206 lists specifications for the entire line.

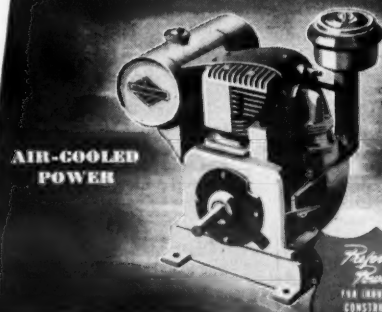
Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 77.

Ford Transfers O'Neil

Transfer of T. J. O'Neil to management of the Memphis, Tenn., Ford sales district, has been announced by the Ford Motor Co. Mr. O'Neil formerly was District Sales Manager at Indianapolis. H. Y. Ingram, who has been Memphis Manager, recently resigned to become a partner in a Ford dealership at Greensboro, N. C. Mr. O'Neil's successor at Indianapolis has not been named.



*Your assurance
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in gasoline engine
performance*



The 27-year record of proved performance by more than 3 million Briggs & Stratton engines is conclusive proof of the value of long experience. Today's Briggs & Stratton 4-cycle air-cooled engines assure all that is best in dependable, trouble-free operation — because more experience is built into them than any other air-cooled gasoline engines.

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E. D. ETNYRE & CO., Oregon, Illinois

Rolled Fills Pushed To Erect Huge Dam

(Continued from page 1)

The selection of impervious material for this center core has been and probably will continue to be one of the big job problems for the contracting firm of Mittry Brothers of Los Angeles, which was the successful low bidder at \$3,415,000 for completion of the Clearwater Dam spillway and embankment. In its natural state the impervious material is wet and hard to handle. Special plowing and diskings are being done in some cases to reduce the moisture content to between 15 and 18 per cent, where it can be handled.

Job Was Previously Started

This big dam was started back in May, 1940. At that time the United Construction Co. of Winona, Minn., began operations on the outlet works; this phase of the project was completed early in 1942. The outlet works consist of a forebay and gate-house structure which connect with a 23-foot-diameter outlet tunnel lined with reinforced concrete, and a reinforced-concrete transition and stilling basin.

The original contract for the excavation of the spillway and construction of the embankment was commenced in 1941 by Mittry Brothers Construction Co. However, after about 1,500,000 yards of rock and clay material were removed from the spillway section and work had been commenced on the embankment section of the dam, the project was suspended in August, 1942. The contract was terminated by the War Department, as the work was not considered essential to the war effort.

During its previous experience on the Clearwater Dam, the Mittry Brothers Construction Co. had an excellent opportunity to study the dam site. And when bids were taken again in April, 1946, for completion of the earth work, the firm landed the job. As the project now stands the scheduled completion date is October 16, 1948.

Dam Background Shows Need

The history of the dam clearly indicates the urgent need of its construction for flood-control purposes. Back in March, 1904, a heavy storm swelled the Black River from its norm of 880 cfs to a 125,000-cfs flood, carrying destruction in its wake. This performance was very nearly repeated in August of 1915, with floods again in 1927, 1933, and 1935. Construction of a dam to help solve this flood problem for the White River watershed has been the result of many years of investigation. The site finally selected by the Corps of Engineers is on Black River about 6 miles west of Piedmont, Mo., in the southeastern corner of the state. Clearwater Dam, when completed, will stand 143 feet above the flood plain. Its crest length will be 4,225 feet, reaching from bluff to bluff. Containing about 5,000,000 cubic yards of fill in three zones, the dam will have a total flood-storage pool of 391,000 acre-feet at the spillway crest; this is equivalent to 8.2 inches of run-off on the contributing drainage area.

The dam's zones are really limited to only two, but two typical zones of pervious river gravel flank each side of the impervious core. The upstream slope, faced with 2 feet of broken stone from the spillway, has a face slope varying from 1 to 3.5 to 1 to 2.5 at the top. Downstream slopes vary from 1 to 2 to 1 to 3.

Fill Work Starts Slowly

When Mittry Brothers moved in to Piedmont to start construction on the embankment and spillway excavation, arrangements had already been made

for the delivery of a huge fleet of new equipment to handle the earth and gravel. Delivery dates had even been verified. But various strikes, transportation tie-ups, and other social and industrial impedimenta plaguing the country about that time, combined to nullify all delivery commitments that were made.

As one of the Ozarkians put it, "They was a-rarin' to go, but couldn't go fer rarin'."

During May, June, and July—all good fill months—the job was bogged. Desperate for new units so it could get under way, Mittry Brothers arranged to take delivery on eleven big 12-cubic-yard bottom-dump Euclids at Cleveland, Ohio, and to drive them over transcontinental highways from the factory to the job. Nine more of these big trucks also made their way to the job, finally.

A Northwest 80-D diesel dragline, two Northwest Model 6's, and a new Lima Model 1201 were brought in to load impervious as well as pervious



C. & E. M. Photo

The placing of impervious fill at Clearwater Dam was going full tilt when the job was visited for **CONTRACTORS AND ENGINEERS MONTHLY**. Shown here are a Euclid dumping, a Gebhard tamping roller at work, and bulldozers leveling off the lifts. The pervious zone is higher due to work done through the winter.

earth. Impervious material is also loaded with a Caterpillar elevating grader. Two LeTourneau Super C Tournapulls and four D8-towed LeTourneau FP Carryalls were also used for a short time. But the routine method soon

settled down to the steady use of the big, fast Euclids.

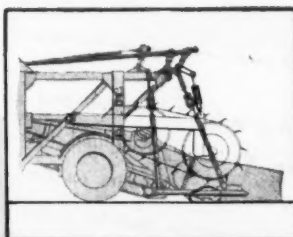
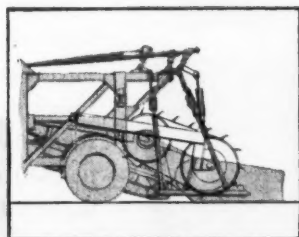
Operations were set up on a two-shift basis. The first shift began at 7 a. m. and ended at 5:30 p.m. The second

(Continued on next page)



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Athey

FORCE-FEED
LOADERS



Rolled Fills Pushed To Erect Huge Dam

((Continued from preceding page))

10-hour shift started at 6 p.m., continuing until 4:30 a.m. next morning. Three Caterpillar-driven 15-kw generators were mounted on skids, along with three 30-kw Caterpillar-driven sets, and these portable light plants were spotted around on the dam for night use. In addition, two stands of a dozen 1,000-watt bulbs each were installed permanently on each abutment, flooding the fill at night with 48,000 watts of light.

Impervious-Fill Methods

When CONTRACTORS AND ENGINEERS MONTHLY's Western Editor visited Clearwater Dam in the early summer, methods of placing impervious fill had been rather well standardized. Genial Oscar K. Mittry, Vice President of Mittry Brothers, who is the Project Manager, was still scratching his head and the borrow pit to try to solve the mystery of impervious earth. But it was all good natured and the job was moving rapidly.

Eight of the big Euclids are assigned to the elevating grader on an average haul of 4,500 feet one way. Maximum hauls are 8,000 feet one way. The haul road is 30 feet wide, but in spite of steady dressing the hauling conditions are mushy and not ideal over much of the pit. The main road leading up to the impervious-fill zone is well consolidated, however, and the Euclids can travel over that part at full speed.

The elevating grader picks up 24 inches of material off the top of the borrow, and travels in a rough triangle as it loads the Euclids, working towards the center of the pit. Pulled by a Caterpillar D7 tractor, the elevating grader turns out an average quantity of 2,300 cubic yards per 10-hour shift.

The impervious earth for the dam core has, of course, been carefully and elaborately classified by the U. S. Engineer Department. But for purposes of description in connection with its mechanical handling, it is a fine river-valley-run silt varying from 5 to 15 per cent sand and from 15 to 20 per cent clay particles. It is packing in at a rate of about 95 per cent of laboratory density or better, using the standard Proctor tests. A figure of 105 pounds of dry density per cubic foot was set up as the minimum allowable standard, and the job is checking in from 108 to 115 pounds per cubic foot, well above the allowable range.

Intermittent rains throughout the spring, with one or two minor floods on the Black River, have kept the borrow pits so wet that special handling has been necessary in connection with dragline work. The pit is being plowed and turned by a heavy tractor-drawn disk to aerate the ground as much as possible. Seven bottom-dump Euclids are assigned to a Northwest Model 6 dragline, which can dig only the top 18 inches or so at a time. Loads of this material are being run in more or less alternately with the drier soil from the elevating grader, and the dragline is loading out about 2,000 cubic yards of material per 10-hour shift.

When Euclids reach the fill, they bottom-dump a strip and keep on going to return to the pit. Loads are dumped to make a full-strip spread from abutment to the end of the first stage of the fill. Each lift is spread by a Caterpillar bulldozer blade mounted on a Caterpillar D7 tractor. Lifts are put in 7 inches thick before compaction begins.

Because the pit-run impervious borrow is always so damp, no moisture blending or pre-rolling processing has been necessary. After a strip has been



C. & E. M. Photos

This general view of operations at Clearwater Dam from high up on the spillway slope shows a Lorain shovel loading a Euclid, a D7 bulldozer dressing the floor, and drilling activity in the background.

leveled off by the bulldozer, there is nothing left to do but roll it. A Gehard sheepsfoot tamping roller, towed by a Caterpillar D8 and ballasted to 525 pounds per square inch of tamping-foot surface, makes six passes over each

lift to give the material its compaction.

Work by this roller usually starts off at the left abutment, and the roller operator tamps a section perhaps 200 or 300 feet long at a time. When the dumping and spreading of the new lift

progress that much farther ahead, the machine is finished and ready to move on for the next section.

During the cold winter months when temperatures were severe even for southern Missouri, work had to be suspended on the impervious fill. The job was geared so that the dragline and most of the Euclids could be profitably concentrated on the two pervious zones, and these portions of the dam were brought up about 25 or 30 feet higher than the center core.

Even during the midsummer season, when working conditions are supposedly best, this shifting of equipment has gone on whenever it rained; whenever wet spots appeared on the borrow area unacceptable for fill; whenever for one reason or another it was impossible to push the center core. When weather and pits permit, however, the impervious work is being speeded with all haste. Slightly more than 400,000 cubic yards of this fill was in place, at the latest estimate.

(Continued on next page)



The SEAMAN mixing sand and bitumen. Sand, because of moisture content had earlier resisted proper curing of mix. The SEAMAN'S characteristic of aeration eliminates such difficulties. Note the footprints which illustrate fluffy, well-aerated mix.

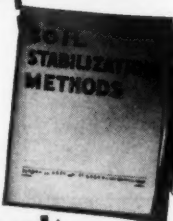
For a Better, Faster Curing Bituminous Treatment... Aerate Solvents or Moisture While You Mix with the

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Hood open operation to reduce high moisture content in aggregate.

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THE HIGH VELOCITY, all-directional movement of aggregates and binder within the hood of the SEAMAN MIXER is one reason why an intimate and thoroughly homogenous mix is quickly produced. But there's also another vitally important advantage: aeration . . . Should the aggregate be running a bit too high in moisture, — the SEAMAN will often save a shut-down, for it dries as it mixes . . . And it's that same simultaneous aeration that helps to evaporate solvents in certain bituminous mixes so that, — after the mix is completed, a faster, firmer set is obtained . . . Many operators have found the SEAMAN invaluable for use in conjunction with mixing plants of conventional design, for the SEAMAN can often double daily output. Again, — that vital factor of drying by aeration, keeps the conventional plant in operation when moisture content of aggregates might otherwise have meant a shut-down . . . So for your regular mixing — and for emergencies, — have the SEAMAN on your jobs.



C. & E. M. Photo
Left to right are Project Engineer P. A. McDonald and Project Manager O. K. Mitty, with the spillway of Clearwater Dam in the background.

Rolled Fills Pushed To Erect Huge Dam

(Continued from preceding page)

Pervious Zones Going Ahead

About 8,000 cubic yards of pervious-zone gravel is rolling into Clearwater Dam every 10-hour shift, according to the latest yardage calculations by Mitty Brothers and the U. S. Engineers. Three draglines—a Lima 1201, a Northwest 80-D, and a Northwest Model 6—are concentrating on a fleet of 15 Euclids to turn in this yardage.

All of the draglines are equipped with Hendrix LS-type perforated dragline buckets, in order to screen out a few of the fines from the gravel while digging 12 to 15 feet under water. The pervious-zone material, about 4,000,000 cubic yards, is all coming from the river floor in the flood-plain area just above and below the dam.

The draglines, spotted on cleared and stripped sections of these gravel beds, dip and bail the material at high speed, dumping to the waiting Euclids. All haul roads are so arranged that the big wagons can approach the draglines, make a turn, and come to a stop in hauling position headed for the fill.

The average haul for Euclids hauling

gravel is $\frac{3}{4}$ mile, and the main road ramping up to the dam is also used by these units. Loaded wagons come up on the fill, dump their gravel close enough so the lifts will be 12 inches thick when spread by a Caterpillar D7-mounted bulldozer, and then return to the draglines. The pervious material is being equipment-compacted by two full coverages of the bulldozer tracks per lift, helped out of course by the passage of the big 21:00 x 24:00 tires on the "Eukes".

Both pervious zones are now well ahead of the center core, due to the work done on these zones last winter. Gravel comes up out of the river completely saturated with water, so placing and compaction are ideal in winter or summer for this material.

A 3-foot layer of broken stone out of the spillway is being placed on the upstream side of the pervious zone as a protection against wave wash. The embankment is being placed from the left abutment, leaving a 500-foot-wide

opening for the Black River to use meanwhile. When Mitty Brothers gets ready to bring this portion of the dam up to elevation, the river will be trained through the permanent outlet structure, now completed.

All Fill Is Sampled

A complete field soils laboratory, operated by the U. S. Engineers on the job, performs the host of mechanical tests currently run on soils on a dam job of this magnitude. Mechanical analyses are taken, Atterberg limits studied, permeability tests run, compaction tests taken out on the dam, and perhaps most important of all are the undisturbed samples taken as a matter of record, and the sample findings filed in the permanent records of the U. S. Engineer Office at Little Rock.

Equipped with a consolidation machine, all mechanical sampling gadgets, and a triaxial machine, the field laboratory runs most of the tests normally

(Continued on next page)

New HEAVY-DUTY ELECTRIC PLANT

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NEW ONAN CK ELECTRIC PLANTS are available in 5,000 Watts D.C., 115 and 230 volts; 2000 and 3000 Watts A.C. in all standard voltages.

ONAN ELECTRIC PLANTS—A.C.: 350 to 35,000 Watts in all standard voltages and frequencies. D.C.: 600 to 15,000 Watts, 115 and 230 Volts. Battery Chargers: 500 to 6,000 Watts, 6, 12, 32 and 115 Volts.

ONAN AIR-COOLED ENGINES—CK: 2-cylinder opposed, 10 HP. BH: 2-cylinder opposed, 5.5 HP. 1B: 1-cylinder, 3.25 HP.

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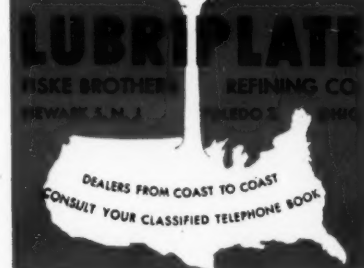
Lubricants definitely reduce friction and wear to a minimum. They lower power costs and prolong the life of equipment to an infinitely greater degree. LUBRIPLATE arrests progressive wear.

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Lubricants protect machine parts against the destructive action of rust and corrosion. This feature alone puts LUBRIPLATE far out in front of conventional lubricants.

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REGULARLY

Road Fills Pushed To Erect Huge Dam

(Continued from preceding page)

referred to main agency offices in work of this kind.

Density tests are taken for each 2,000 cubic yards on impervious fill, using the oil-volume method of determination. The exact frequency and location of these tests is governed to a great extent in the field, and enough latitude to analyze compaction conditions intelligently is definitely a field possession on this job.

Densities are run less frequently on the pervious zones; perhaps once in 10,000 cubic yards, using the sand-volume method of determination.

Working in close cooperation with Mitty Brothers, the soils laboratory is doing its best to keep under-compaction in such close control that rejectable fill does not become a part of the finished dam.

Spillway Excavation

Of 1,000,000 cubic yards of hard excavation that remained at the start of this contract in the big 125,100-cfs-capacity spillway, nearly 350,000 yards are hard rock. Excavation of the rock portion of the spillway cut is being done by Mitty Brothers men and equipment. The 660,000 cubic yards of common excavation has been sublet to Perry McGlone Construction Co. of Kansas City, Mo.

So mixed and jumbled are the "common" and the "rock" parts of this big cut that the entire excavating activity seems to belong only to one contractor.



C. & E. M. Photo

A Caterpillar elevating grader loads one of the 20 Euclids, Mitty Brothers used on its Clearwater Dam contract.

Drilling, shooting, bulldozing, tractor-scraper work, and shovel loading are simultaneous parts of one big operation.

Oscar Mitty knew this would be tough. He had previous practice and experience in that spillway, when the company dug about 1,500,000 yards before the war. But the spillway cut has seemed to get even harder and trickier as it nears bottom.

What makes excavation so mean are the numerous clay pockets all mixed up in the ledges and shards of limestone and sand rock. A drill may penetrate 5 feet of clay with ease, and spin for five minutes on a hard rock pocket less than 3 feet through. Explosives may break the cut up fairly well, or they may blow out at the clay pockets and generally mess up a shot.

It is a slow, tedious, bruising, tough battle. Mitty is using two 365-cfm Sullivan compressors, a 310-cfm Ingersoll-Rand, an Ingersoll-Rand and a Gardner-Denver wagon drill, and several jackhammers for secondary drill-

ing. Timken steel with Timken detachable rock bits is being used, with a maximum length of 18 feet. When the drillers get a hole down they spring it three times with 1, 2, and 4 sticks of Gelamite No. 3 powder, and then load it with Hercomite Bag X powder at a

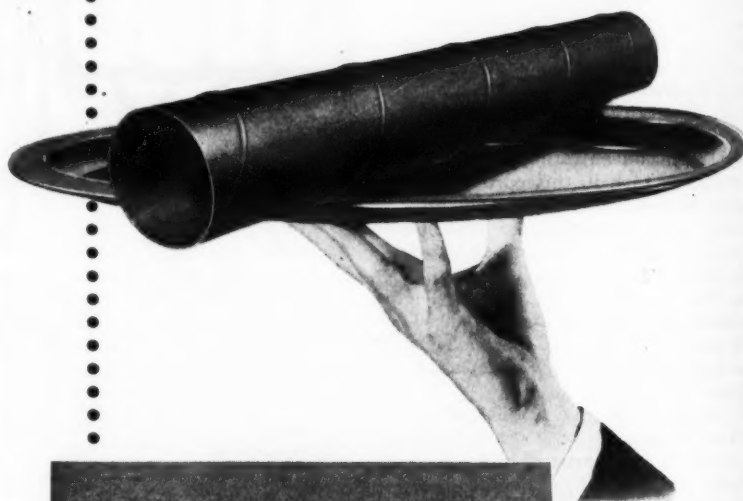
rate of not less than 3/4 pound to the cubic yard of rock. Hole centers range from 3 to 5 feet, depending entirely on the character of the rock. The shots are detonated by No. 6 electric blasting caps, one to each hole.

When each shot is pulled, a number of people usually pray. Mr. Mitty of course prays that the shot will be good because a well broken blast is more profitable to handle. The shovel runner prays for good breakage, because it means less wooling around of the big ones for him. The powderman certainly does some beseeching, because the tattered remains of his well worn reputation are at stake. The jackhammer men mumble, because secondary drilling is not fun. Everybody in the spillway seems to have more than usual interest in every shot.

Good or bad, the broken rock is loaded out by a 2-yard Lorain shovel. This machine serves four end-dump Euclids each hauling 11 cubic yards, and six 10-yard Mack end-dump trucks

(Concluded on next page, Col. 2)

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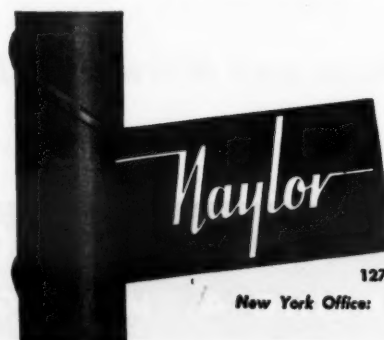


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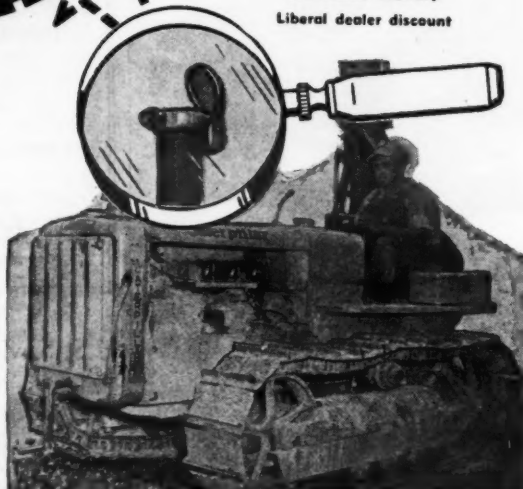
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THE CAP THAT DOES NOT FORGET TO CLOSE . . . Completely automatic—the "RAINCAP" is counter-balanced to open when the tractor starts and close when it stops. Rust proof—made of cast aluminum—can be installed in two minutes. F.O.B. Waterloo, Iowa.

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3	2 3/4"	1.90
5	1 7/8"	1.90
55	2"	1.90
6	1 1/2"	1.90
7	2 1/2"	1.90
8	3"	2.50
9	3 1/8"	2.50
10	3 1/4"	2.50
11	3 1/2"	2.75
12	4"	3.00

WATERLOO FOUNDRY CO., WATERLOO, IOWA



The new Katolight generating plant has a capacity of 2,500 watts, alternating current. It is 28 inches long, 30 inches wide, and 26 inches high.

AC Generating Plant

A new-model generating plant is made by Kato Engineering Co., Man-kato, Minn. It has a capacity of 2,500 watts, alternating current. The dc winding has sufficient capacity to charge a standard 32-volt glass-jar-type battery.

The Katolight plant can be furnished with full automatic control or remote control. A voltage regulator holds ac voltage to within 5 volts of change between no load and full load. The plant comes complete with battery-charging relays.

The generator is mounted on the side of a Briggs & Stratton Model Z2P gasoline engine. The engine is available with a gravity-feed tank or fuel pump to permit drawing fuel from underground supply tanks.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 20.

Handbook on Bitumens

A 58-page pocket-size handbook describing its line of emulsified asphalts and asphaltic composition products is being distributed by the American Bitumuls Co., 200 Bush St., San Francisco, Calif., and its District Offices throughout the United States. Bulletin A-10 contains helpful information on bituminous paving materials for use by engineers, contractors, and road builders.

The bulletin describes the various types of asphaltic surfaces, materials, and pavements. It describes briefly how these materials should be laid. It contains 20 pages of tables covering many phases of asphaltic construction and matters relating to it. It also gives information on the proper handling of asphaltic materials.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 79.

Tractor-Mounted Loader

A new folder which describes its tractor-mounted Shovel loader is available from the Lull Mfg. Co., 3612 E. 44th St., Minneapolis 6, Minn. Bulletin AD-10 shows the Lull Shovel loader performing various earth-moving jobs—loading, dozing, carrying, etc.

Feature of the bulletin is a list of 41 advantages claimed for this unit. And on the back page is a table of specifications covering the Models 4-A, 4-B, and 4-C.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 70.

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Road Fills Pushed To Erect Huge Dam

(Continued from preceding page)

Rock is fed to the front of the shovel where possible by one of two Caterpillar D8-mounted bulldozers in the pit. Some of the better loads of broken stone are used for dam facing, but most of the material is being wasted downstream from the spillway in a designated waste area. Mittry Brothers is handling 1,000 cubic yards of rock per 10-hour shift in the spillway with the above equipment. A great deal of secondary drilling and shooting is being done.

Perry McGlone's equipment fleet for common spillway excavation, which is turning out about 240 cubic yards per hour, consists of a Northwest 80-D shovel with two Heil 13-cubic-yard bottom-dump wagons, five 11-cubic-yard end-dump Euclids, three Gar Wood cable-controlled scrapers and a LeTourneau Carryall, two Caterpillar D8's and two Allis-Chalmers HD-44's for drawbar power. A Caterpillar No. 12 motor grader is also doing duty on the haul road.

The tractor equipment is taking out excavation where possible. Harder parts of the cut containing rock outcrops are being removed by the shovel.

Frequently, as the side slopes are cut down, bad rock outcrops have to be left standing until a jackhammer and compressor can get around to drilling and shooting them. Berms are located at Elevation 680, 650, 620, and 600, at the bottom of the side slopes. A rock-paved mortar-slashed drain trench at those points will carry rain run-off away.

Personnel

Clearwater Dam is being built under the general direction of Colonel G. E. Galloway, CE, District Engineer of the Little Rock Engineer District.

F. K. Mittry, Sr., President of Mittry Brothers, is often seen at Clearwater, though his headquarters are in Los Angeles. His brother, Oscar Mittry, Vice President of the company, is managing the project in the field, assisted by F. K. Mittry, Jr., recently discharged from the service. P. A. McDonald is the Office Manager and Engineer, and Earl

Caperton is Master Mechanic.

The Army Engineers are represented in the field by John T. Dwyer, Engineer in Charge, with F. E. Clary as his assistant and G. H. Dolloff, Soils Engineer, in charge of testing and inspection of earth fill.

Completion of Clearwater Dam will forge another very important link in a big chain of projects designed to cut down the flood rate of the lower Mississippi, reduce damage, and prevent the loss of life in the upper reaches of tributary streams.

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The Cummings Sally Saw can be operated by one man. It weighs 63 pounds and has a 16-inch-diameter cutting blade. It is powered by a 1½-hp 4-cycle CMW gasoline engine.

Portable Power Saw Has a 16-Inch Blade

A portable power saw for felling trees, clearing underbrush, and other wood-cutting operations is made by the Cummings Machine Works, 9-11 Melcher St., Boston 10, Mass. The Sally Saw is one-man-operated, weighs 63 pounds, and has a 16-inch-diameter cutting blade.

The saw is powered by a 1½-hp 4-cycle CMW gasoline engine. Its blade is equipped with a guard and also an adjustable support. For additional ease of operation, there is a folding-leg support at the rear of the saw unit. A hand-clamp screw adjusts the angle of cut. The standard 16-inch model will cut through an 11-inch tree or log in one pass, the manufacturer says, and larger trees can be handled by moving around them.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 50.

Cleaning Methods Outlined

A booklet which describes its line of cleaning materials for automotive equipment has been prepared by Oakite Products, Inc., 72 Thames St., New York 6, N. Y. Booklet No. 4401R5 describes the Oakite cleaning materials and methods, and tells how to install and use the equipment properly. It covers special problems which influence each cleaning or related operations, and outlines methods which have proved successful for each type of work.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 64.

Contractors Given Break On Time-Penalty Clauses

The contractors of Kentucky have been promised a break on penalty clauses by the Kentucky Department of Highways. With almost every highway contractor facing payment of damages for failure to complete work on contracts awarded due to this season's bad weather, the State stands ready to cooperate by reasonable time extensions.

In addressing a group of contractors at a special meeting, J. Stephen Watkins, Commissioner, stated that "the Department appreciates your cooperation and your fair and reasonable prices, and . . . it is not our wish to see you penalized for the freakish weather of the past several months . . . You may be assured", he continued, "that a committee from the Department will take under advisement the conditions which affect your work and that relief will be granted."

In addition to shortages of labor and material and delays in delivery, contractors in Kentucky have been hampered by extremely rainy weather. Weather bureau reports from April 1 to August 1 in the Lexington area indicate rain for 32 days, while the same period in the Louisville area reported 54 days.

Equipment for Handling Bituminous Road Materials

A broadside describing several pieces of its equipment for handling bituminous materials has been issued by Littleford Bros., Inc., 485 E. Pearl St., Cincinnati 2, Ohio. Equipment discussed in Bulletin B-147 includes the Model No. 115 Tanker steam heater, Models No. 102 and 103 supply tanks, Models CLRA and CLRC Spray Master pressure distributors, the Trail-O-Distributor, and Models No. 108 and 106 highway brooms.

Outstanding features of the units are presented, the conditions under which they are recommended for use are described, the component parts are shown, and capacities and limits are listed.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 81.

Gunite Specialists

A catalog describing its facilities and equipment has been prepared by the

Gunite Concrete & Construction Co., 1301 Woodswether Road, Kansas City, Mo. Feature of the catalog is a discussion of Gunite and its physical characteristics, its adaptability, and outstanding advantages.

The catalog contains many pictures showing applications of Gunite concrete. It also contains drawings of

standard Gunite cross sections for work. Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 88.

The Community Chest in your locality will soon be asking once more for your support for its services. Give generously to its 1947 campaign.

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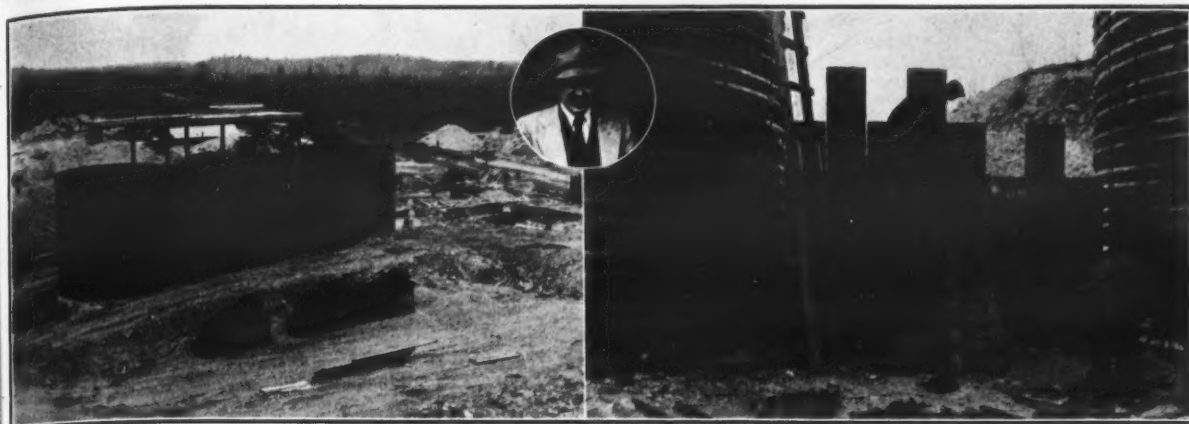
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SINGLE-ACTING PILE HAMMERS THAT WILL OPERATE UNDER WATER

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Write for Full Information
McKiernan-Terry Bulletin No. 57 gives diagrams, specifications, operating notes, etc. Copy sent free on request.

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The E. P. Brady & Co. aggregate plant was set up under the supervision of J. C. Brady (see insert). Three silos for storing gravel (see left) are each 30 feet inside diameter and 30 feet high above their circular concrete footings. They are 42 feet center to center with a 12-foot web between. At the right, Armco plates for a web are being bolted together.

Giant Silos Used To Store Aggregate

Separation and Storage Of Seven Sizes of Sand And Stone Handled by Silo-Conveyor Set-Up

By J. C. BRADY, E. P. Brady & Co., Flint, Mich.

PROCESSING and handling 2,500 cubic yards of gravel a day at a new aggregate plant owned by E. P. Brady & Co. has been simplified by the construction of three large silos set up over a belt-conveyor tunnel. This plant is located near Millersburg in Presque Isle County, Mich., in what is known as the "big cut" along the Detroit & Mackinac Railway. On the south side of the tracks there are 40 acres, with 80 acres on the north.

The gravel in this location is of good commercial grade, and at one time the railroad operated its own gravel plant at the site. When fire destroyed the plant equipment, the site was abandoned until late in 1946 when Brady leased the land for 10 years or longer. Although there are rock aggregates in this part of Michigan, this is the only pit producing gravel.

Plant Lay-Out

The plant is laid out on both sides of the tracks, with the primary jaw crusher on the south side and the roll crusher, screens, washing equipment, and silos for storage on the north side. The gravel is being taken from the south side.

After the light overburden is removed, a 1½-cubic-yard Northwest crane loads the raw gravel into a traveling grizzly from which it goes directly to the 24 x 36-inch primary jaw crusher. This crusher operates on a railroad track parallel to the direction in which the crane is traveling. From the crusher the material is dumped onto

a 300-foot field belt conveyor 30 inches wide which transfers it to another 60-foot belt conveyor. The latter is located in a concrete service tunnel under the two railroad tracks. On the other side

of the tracks, a 90-foot belt conveyor takes the material to the roll-crusher house where it passes over a 4 x 12-foot scalping screen.

The crushed gravel then passes up an

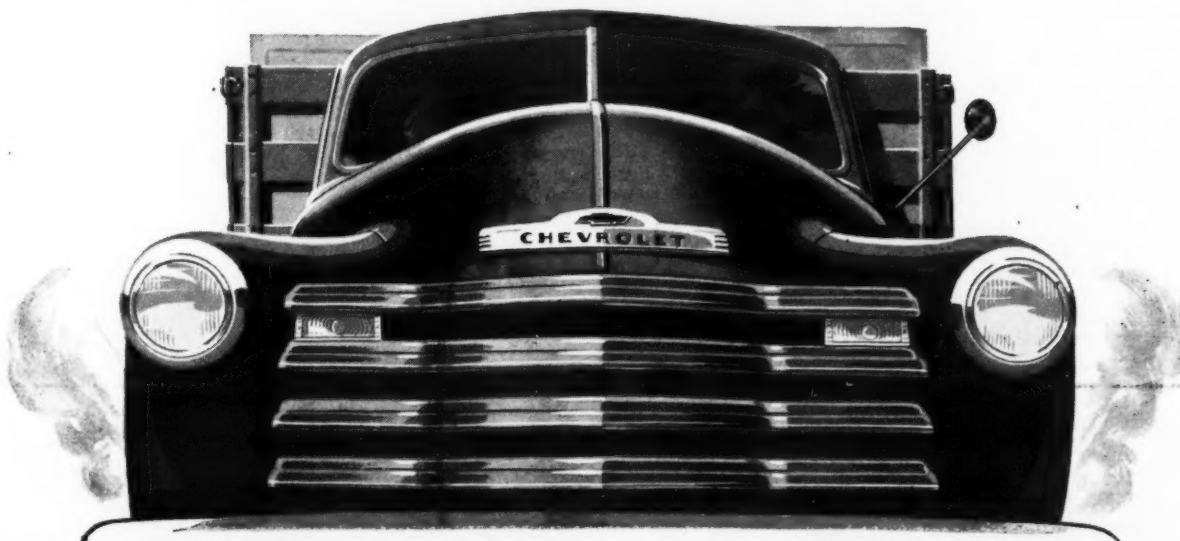
inclined belt conveyor 150 feet long to the screen house on top of three silos, 42 feet above the ground. There a series of three 4 x 12-foot washing screens separates the material into seven different-size groups, from sand to 2-inch stone. It then passes by gravity into or around the silos. Sand ½ to ¾ inch and material 1½ to 2 inches in size go to the three silos, while the intermediate sizes are stockpiled around the silos.

All of the belt-conveyor equipment, crushers, and screens, were supplied by the Pioneer Equipment Co. Water for washing the gravel is pumped through 8-inch Armco spiral-welded pipe from a near-by lake on the north side of the track. Electric power for all the operations is furnished by two 350-hp General Motors direct-drive 200-kw diesel-electric sets.

Loading the Gravel

The processed gravel from inside and around the three silos is dropped (Concluded on next page)

With men who know trucks—THEY CARRY THE WEIGHT!



CHEVROLET Advance-Design TRUCKS

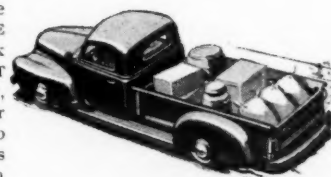
With experienced truck users, Chevrolet's new line of ADVANCE-DESIGN trucks definitely carries the weight—by preference and pounds! They're new . . . they're ahead of the times with Advance Design and the cab that "breathes"—that almost literally "inhales" fresh air and "exhales" used air.* Here's profit-power and performance, plus new features and innovations well worth seeing—well worth owning!

The cab is FLEXI-MOUNTED—cushioned on rubber against road shocks, torsion and vibration! . . . DRIVER'S COMPARTMENT is wider, with more leg room. The seats are fully adjustable, bigger and more comfortable. Wider, deeper WINDSHIELD and WINDOWS increase visibility by 22%!

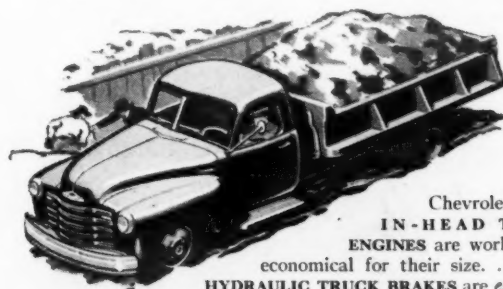


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Giant Silos Used To Store Aggregate

(Continued from preceding page)

through a small roller gate in the top of a 96-inch Armco tunnel, 195 feet long, located directly under the center of the silos. Inside this tunnel is a 30-inch belt which conveys the various sizes of gravel to another ascending belt, 125 feet long. This deposits it in two 60-ton loading bins over the railroad switch track. Here it is loaded into gondola cars for shipment.

Construction of Silos

The three silos for storing the gravel are unusual in their size and construction. They are each 30 feet inside diameter and 30 feet high above the circular concrete footings on which they rest. They are 42 feet center to center with a 12-foot web between.

The individual Armco liner plates which make up the silos are 18 inches wide and approximately 50 1/4 inches long, with flanged edges and offset joints for bolting. Air wrenches were used in the bolting operations. These plates are of No. 5-gage uncoated steel, while those used in the tunnel below the silos are of No. 7-gage steel. They were sprayed with asphalt before being put into service. The uncurved plates for the web connecting the silos are bolted together in the same manner, and in turn are bolted through the sides of the silos.

No scaffolding was needed in constructing the bins or webs. Metal rungs or steps bolted to the inside of the bins, plus the flanges, made it possible to climb up and down inside. The construction operations were carried on through the winter months, though deep snows in late April somewhat interfered with the work.

The plant was set up under the direct supervision of J. C. Brady and James Scott, Engineer, under the general supervision of E. P. Brady.

Contractors' Hand Tools

A line of hand and pneumatic tools for use by contractors is described and illustrated in a catalog put out by the Atlantic Steel Corp., 1775 Broadway, New York 19, N. Y. Featured on double-page spreads are the Atlantic pipe driver and the rock breaker.

Tools listed in the catalog are moil points, cape chisel points, concave chisel points, asphalt cutters, digging chisels, 3-inch chisel bits or asphalt cutters, hexagonal hollow drill steels, hollow drill rods, pneumatic chisel blanks and chisels, and bars.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 82.

Link-Belt Engineer

Among promotions recently announced for executives of the Pershing Road plant of the Link-Belt Co. in Chicago, is that of Ralph W. Rausch as Chief Engineer. He succeeds C. S. Huntington who has retired because of ill health.

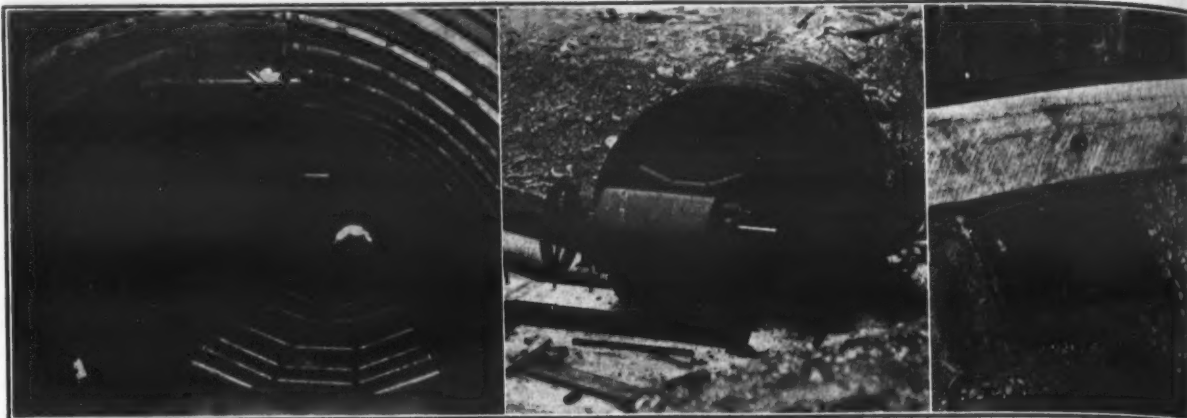
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Processed gravel from the three silos at the Brady plant drops through a small roller gate in the top of a 96-inch Armco tunnel onto a 30-inch belt (left). This and another ascending belt 125 feet long deposit it in loading bins. The center photo shows the tunnel outlet; at the right is shown a gate in the top of the tunnel adjacent to the web between the silos.

Hobson of du Pont Retires

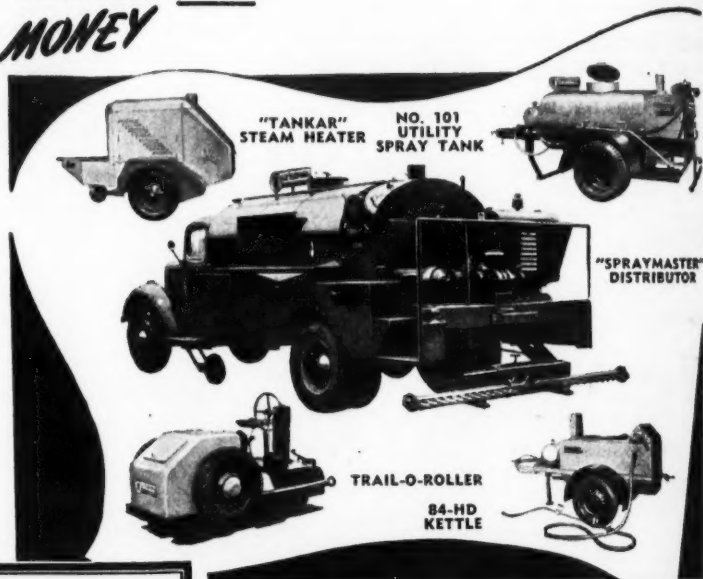
Harry W. Hobson, an Assistant Director of Sales in the Explosives De-

partment, died July 28, a few days before he was to have retired from active duty with E. I. du Pont de Nemours & Co. He has been succeeded by George

H. Loving, who, in turn, has been succeeded by J. A. Dallas as an Assistant Director in charge of chemical and miscellaneous sales.

Roads Must Take a Beating ... but WHY SHOULD YOU? LITTLEFORD SAVES YOU MONEY

Speed and efficiency are built into every unit of equipment that Littleford produces for the construction and maintenance of black top roads. From the big Spray Masters that lay it down in any width up to 24 feet, right through the line to the most inexpensive spray kettles, Littleford equipment moves faster, heats faster, operates faster. For almost fifty years Littleford has engineered and designed simplified units for every function in heating and application. Save yourself some money by getting the facts about the entire Littleford line. Write for Catalog W.



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For further information on the new equipment, new materials, and new literature described in this issue of Contractors and Engineers Monthly, check the item number on the enclosed Red Request Card. No obligation, of course, and we will forward your request directly to the manufacturer.

Contractors and Engineers Monthly
470 Fourth Ave., New York 16, N. Y.

Snow Storm Batters State's Road System

(Continued from page 2)

younger division assistant, all of which had plagued him at some time or another back in the days when he himself had served in that job.

All the patrolmen would be crying for more equipment, he knew, as the snow closed in on them. He could hear their requests pouring in. He could feel, as if he were right there, that twinge of conscience any maintenance man feels when he is forced to keep main transcontinental arteries open, and must allow friends and acquaintances to snow in on the secondary back roads. He felt already in himself the tension of Shumate's men who might soon be forced to work beyond the normal limit of human endurance.

Always at these moments the old urge to get out in the storm with his men returned to the war horse of a man behind the desk. Once more he had to suppress it. He had come to know that only there in the Denver office could he correlate, to good purpose, the efforts of men and equipment under his far-flung command. Only in the midst of the mile-high nerve center, among his maps, his records—and his memories of other snow battles—could he hope to shuffle his forces correctly.

The sting of a driving snowstorm, the stiffening of face muscles in bitter chill air, the roar of a diesel engine above the wind: in this the biggest snow fight of his career, none of these could be for him.

Gruffly, hiding his disappointment, he told Shumate, "Yes, Charlie, it's tough and it's likely to get tougher. Give it hell. I'm going home. You can reach me there any time tonight. Call me if you need anything, understand?"

Preparing for the Worst

Inching his way home through the snow-filled streets that night, Stewart went over and over the situation.

Heavy snow wasn't new, either to him or the men in his department. Peak falls totaling 961 inches in a year had been successfully handled in the past. But suppose the storm held long enough to lay down a 45 or 50-inch blanket within a matter of a few days? Suppose wind velocities stayed up, and the snow started to drift behind the plows. Suppose a dozen stranded motorists froze to death looking for help.

With most snow-fighting equipment well worn, though repaired, he knew that anything might happen if the battle was prolonged. Bitterly he realized there was no conceivable way to shorten it. Shumate and his men would work all night long, he knew. Down on Raton Pass, Joe Bowles' big rotary would be busy eating up the push-plow windrow along the shoulders and blowing it at high velocity 70 or 80 feet off the road. The flashing blue lights which mark Colorado's snow-fighting equipment would wink all night long into the blackness, warning stray motorists of danger.

During the long years of transition to the patrol system of maintenance from the gang system, Stewart had developed real concern for those stray motorists. Why they wouldn't wait in their automobiles until a patrol truck came by, he had been unable to understand. Fear, perhaps. He recalled how many panic-stricken drivers had left their cars in the past to wander, alone and lost, through the dangerous cold.

Aside from his concern about the drivers, Stewart had worries only about the storm. He had none about Charlie Shumate. Shumate was good and dependable. Shumate would fight the storm according to plan, and in an emergency might come up with some-

thing new, all on his own. Shumate would concentrate his big all-wheel-drive trucks and plows on the main highways. He would push the snow off as far as possible, in any case maintaining the necessary two-lane opening for automobiles. He would operate on the theory that continuous plowing is easier than opening a highway after snow has blocked it.

The big question in Stewart's mind that Saturday night—and, he knew, in the minds of men out on the equipment—was, "How much longer will it last?"

When Shumate called him Sunday morning the situation was growing slowly worse. He thought Shumate's voice sounded tired, and far away. After their conversation, and for the rest of that long day, the big man who looks something like W. C. Fields waited, hoping the worst was over.

Trouble Piles Up

But the worst had not begun. The buzzing telephone at 10 p.m. told him so.

"I guess it's starting, Doug," Shumate announced. "Joe's rotary broke down at Raton Pass."

"How long ago?"

"About 9:30 this evening. Highway 85 is blocking north of Wootton."

"Made any shifts along the line to compensate?"

"We had to," Shumate explained. "I'm pulling a rotary from Sears, over at Granada, and starting it for Raton Pass."

The big rotary plow was faced with the job of moving 150 miles in the dead of night to make the transfer. Patrolman E. F. Sears, who handled the 34-mile section from Hasty to a point 6.2 miles west of Granada, would dispatch the machine at once, but even so, in the dead of night...

Stewart asked, "That will take a little time, won't it? Hadn't you better bring some other equipment down from the north?"

"I just ordered everything not on strict emergency to start rolling down 85," Shumate replied. "Maybe I ordered some that was on emergency work, too."

"Good. How's the rest of the division?"

"I can't say it's good, because it isn't. We've been able to keep 85 and 87 open north and south of Pueblo until this machine broke down tonight. Every man has been plowing snow since noon yesterday. That's 34 hours, Doug. The



C. & E. M. Photo

It was from this busy desk and telephone that D. M. Stewart, Colorado's Superintendent of Maintenance, directed the memorable snow battle of November 2-14, 1946.

snow may catch up north of here where we've pulled some of the equipment."

"How much public criticism are you (Continued on next page)

MEMO
TO ALL CONSTRUCTION SUPTS.:-

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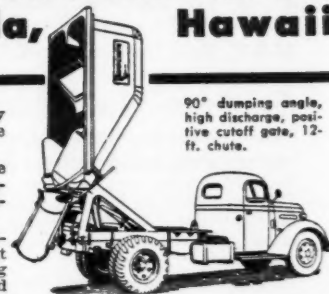


Concrete men all over the country have found out that the Dumpcrete hauls good concrete at low cost.

They have learned how to produce better concrete cheaper with a central mixing plant, air-entrained concrete, and the Dumpcrete.

This low-cost way to produce top-quality concrete is used with great success by ready-mix and building supply companies, by highway and industrial contractors, by house builders and heavy construction concerns, and by local, state and national government agencies.

They are hauling concrete over 45 minutes without agitation and without segregation. They are dumping into buckets, hoppers and forms with-



90° dumping angle, high discharge, positive cutoff gate, 12-ft. chute.

out a ramp. They are placing low-slump, easy-to-work concrete right where it's wanted with a long 12-foot chute.

They are using the Dumpcrete as a utility body, too... to haul sand, gravel, mortar, coal and earth.

Their costs are low. Their production is high. No wonder they like the Dumpcrete.

You will want to learn more about the Dumpcrete. Send the coupon today. Early delivery.

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City _____ State _____

Snow Storm Batters State's Road System

(Continued from preceding page)

getting?" Stewart stabbed the question. "Plenty. Dozens of families are snowed in. Livestock can't be fed."

"Yes, I know, Charlie. The antelope are starving, too. A guy called me up this morning to tell me you weren't feeding them. Said he was going to the Governor about it."

"You're not kidding, Doug?"

"Hell, no. I told him what you were up against. I told him you had orders to keep the roads open, and you'd be busy enough to keep out of trouble."

"Well, we've gone off the main highways twice today to take two sick people to the hospital. We've pulled dozens of stranded cars out of drifts. People in the livestock camps are kicking most of all, because several times we've had to refuse to plow roads off the main highways."

"I'll probably hear about that tomorrow in the newspapers," Stewart muttered. "Stand your ground, Charlie. I'll back you up in whatever you do. Just remember you're doing a bigger public service when you use equipment to keep the main highways open. That way, people can get supplies in close enough to make the rest of the trip on horseback."

How much longer would the storm last? Could the men stand up long enough? What equipment would break down next? Those were the questions in Stewart's mind. He had canvassed the divisions over the remainder of the



Colo. State Highway Dept. Photo

A Bros snow plow recently purchased by the Colorado State Highway Department is opening up Raton Pass which was blocked during the severe November storm.

state, of course. But how could he pull machines away from the high mountains towards the west? Berthoud, Rabbit Ears, Monarch Pass—all stood in imminent danger of heavy snow. How could he risk letting those transcontinental passes become blocked to prevent a similar situation farther down?

The newspapers, too, were beginning to play the story. Public attention was being focused on the discomforts of the storm. Pressure of various kinds was starting to pour in. The strain was beginning to tell. Late Monday night Shumate telephoned.

"The rotary got to Joe about 10 this morning," he reported wearily. "Five truck-mounted blades helped. We opened Raton about 5 this afternoon. The rotary is still working to widen the lane."

"How's everything else?"

"Highway 85 along the mountains is under control."

"Yes, I heard the storm had stopped there."

"It hasn't stopped, Doug. It's just slowed down a little. It's probably backing off for a new start."

"How about the men?"

"They've all worked 60 hours without rest. I gave orders to move all the stuff we can spare from 85 towards the east, just as soon as the men can get a few hours of sleep."

"Are they complaining?"

"Not a damn one. You never saw a gang like this, Doug. They've all reached the point of breakdown, but they insist on going on. They all need rest. If we take it, we'll be in trouble from La Junta east, because it's getting worse and worse over that way."

"They've got to rest some time," Stewart said. "Maybe a few hours' sleep will be worth the chance you take. Try it."

Stewart's tip worked out. Shumate took the chance and equipment operators slept for a few short hours, some in their cabs. Then they roused themselves again to resume the battle.

(Continued on next page)

ALL IN A DAY'S WORK

8 A.M.

• LOADING FROM STOCKPILE AT 8 A.M.



10 A.M.

• DITCHING 30 MILES AWAY AT 10 A.M.

The SCHIELD BANTAM travels on the highway at normal speeds. Drives right up to the job and starts to work without wasting time. Use it as a dipper, trench hoe or dragline. The BANTAM handles stockpile material at a rapid pace, digs ditches in varying widths up to 10' deep, and works wherever larger heavy weight equipment is not profitable. Simple, centralized controls. Full-circle design. Perfectly balanced for easy handling. Interchangeable booms. Wide selection of attachments for fast operations. Complete unit weighs 4 tons. Mounts on any 1½ ton truck.

WRITE FOR COMPLETE DETAILS

SCHIELD BANTAM CO. INC.
Waverly, Iowa

SCHIELD BANTAM 1/3YARD PORTABLE SHOVEL-TRENCH HOE-CLAM-DAGLINE



OTC
MAINTENANCE
TOOLS

**RUGGED
TOOLS for
TOUGH JOBS**

DEPENDABLE heavy duty tools for pulling and installing bearings, gears, sleeves, wheels, shafts and other close-fitting parts. Made of high alloy, drop forged, heat-treated steels, precision machined—strong, easy to handle, portable, SAFE to use, FAST-working! Approved by Hyatt, M-R-C, New Departure, SKF, Timken, and by Tractor Manufacturers.

OTC PULLERS and Attachments, BOX WRENCHES and other tools in sizes to handle practically every maintenance job.

FACTORY APPROVED CATERPILLAR SET
Essential service equipment for all CATERPILLAR Tractors; also used on other tractors and on road machinery. Other sets available to meet your needs.

Write for OTC Maintenance Bulletin showing many time-saving OTC uses.

OWATONNA TOOL CO.
348 Cedar St., Owatonna, Minn.



Cole, State Highway Dept. Photo

Here is what Stewart faced when he gambled on pulling push plows off to send them farther east. For in a heavy storm highways soon look like this.

Snow Storm Batters State's Road System

(Continued from preceding page)

Wind Drifts Snow

At daylight Tuesday morning the storm lulled, but the sky stayed dark and gray. Stewart, who had fought snow in southeastern Colorado himself in his younger days, knew what was coming.

"You'll have to plow harder now than ever before," he told Shumate. "You're going to have worse wind to contend with before night."

His prediction proved true. All day Tuesday the wind whistled over the eastern plains, reaching 50 miles an hour. Great drifts of snow obliterated the snow fences and sifted down across the highways.

Push Plows Fail

"We're in a jam, Doug," Shumate reported late Tuesday night. "Some of our push plows are breaking down. Every one that breaks down makes the job tougher."

"Which section is the worst?" Stewart asked.

"From Colorado Springs east to Cheyenne Wells, on 24 and 40. Conditions there are critical. The damned road blocks with drifts as fast as we can open it up. We've got sixteen 5-ton 4-wheelers on 160 miles of that section!"

"Hitting those heavy drifts at full power doesn't do a plow any good," Stewart said ruefully. "And you can't blame the equipment, either; it's already given three times more than normal service. What have you got down on 287?"

"We've got fifteen truck plows, a rotary, and four motor graders."

"Can you move any of those?"

"No. Our problem now is how to maintain a road at all. We're down to one lane in a few places."

"All right, then. Keep after it. Fight it with everything you've got. I'm going to take a chance and pull out a few more rigs up here to send down to you. But it's beginning to look like an early winter all over the state."

In the face of this situation, Stewart for three days parried pressure and requests for special favors from the public, from stockmen and from various agencies. Calls came pouring in. Traffic delays of from two to five hours were reported. Patiently Stewart explained, as tactfully as he could, that the storm was the worst he had ever seen, and that maintenance crews were working at a superhuman pace. Privately he growled, "What do the damn fools expect? My men work 60 hours in a row and these skiers raise hell about a 4-hour delay!"

When Shumate made his telephone calls now, his fatigue was apparent over the wire. It seemed to Stewart as the week went on that his men and equipment had long since passed the limit of

endurance, and he marveled at their stamina. Constantly in his thoughts were those men with equipment, fighting the 35,000-square-mile vastness of snow, so that people might travel. Parts of the picture—dozens of them—were vivid in Stewart's mind.

A pick-up truck, for example, grinding through the night in second gear, plowing through snow with chains on, to carry a drum of fuel out to an over-worked piece of equipment. A mechanic in the shop at Pueblo, repairing a broken part, or driving out to make an on-the-spot weld to brace a plow frame.

The grind of a plow moldboard, touching off a shower of sparks against the hard pavement, almost incongruous in the frozen waste . . . the oily, hot, comfortable smell of a hard-working diesel seeping up in the cab of a motor grader . . . the dreadful monotony of hours on end of fighting the storm . . . the anxiety of wives and mothers at home, reading in the evening paper of stranded cars, wondering and praying for the safety of their men . . . a roaring diesel exhaust stack spitting blue flame at midnight . . . scalding coffee, frozen sandwiches . . .

All parts of the picture were there. They fitted together. They were not obscured by any larger view. Chafing inwardly, outwardly unexcited, Stewart stayed with his maps, giving all the moral support that was in him to each small part of the battle.

How much longer? How much more punishment?

New Storm Strikes!

He was destined to find this out in a way he will long remember. On Thursday the storm broke anew. From 30 miles east of Pueblo to the Kansas line, white flakes poured in on the tail end of a shrieking blizzard. Twelve inches, fourteen inches, sixteen inches, seventeen inches, eighteen inches—all in 12 hours—began to pile in on top of the previous snow. Total snowfall in inches was mounting rapidly now: 50 inches at Lamar, 46 at Thatcher, 46 at Eads. Stewart could imagine the trouble Patrolman Victor Quinn was having around Eads, for the plains are flat in Kiowa County, and wind can play havoc with 46 inches of snow.

Twice Friday afternoon he called Pueblo. Twice he failed to contact Shumate.

Then Jim Bell, Division Engineer at Pueblo, electrified him with this expla-

nation: "Shumate went up in an airplane to study the situation and move his equipment around!"

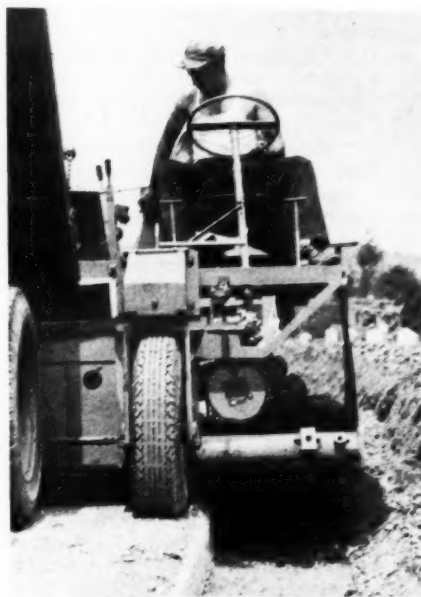
"Good God! In this storm? He'll have to fly dangerously low to see!"

"I know, Doug, but that's the way he wanted it."

Now, more than ever, Stewart wor-

ried. All the advantages of two-way radio for snow-fighting equipment taunted him. Despite all favorable recommendations, Colorado's machines were not so equipped. The two-way radio demonstration at the annual AASHO meeting was still in the future, (Concluded on next page)

AN APSCO ROAD WIDENER SOON PAYS FOR ITSELF!



Operator has full view of work—two man crew easily operates machine.

Speedy handling of road building materials, any kind, any size, plus accurate controls and other features, make for unheard of economy in road widening.

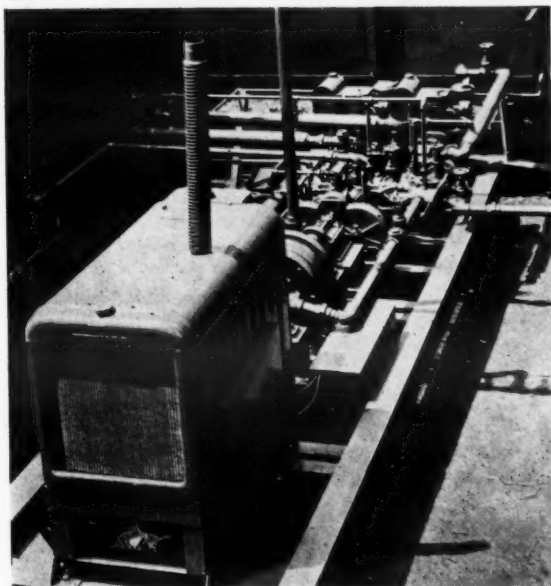
Dump truck backs up to APSCO WIDENER, is pushed forward by widener as trench is filled. Width of fill can be adjusted, 2' to 8'—or even wider, depending on size of machine.

Made in three sizes—models 60, 70 and 80.

Authentic reports from contractors verify our statement that this widener soon pays for itself. In one case, it took only 3½ miles to do so. Send for a copy of his letter, if you are interested. Write for bulletin!

The ALL-PURPOSE SPREADER CO.
ELYRIA, OHIO

IF YOU USE LIQUID ASPHALT



Model B-14, Diesel Power, Capacity 3000 gallons per hour.

YOU SHOULD CONSIDER MANUFACTURING EMULSIFIED ASPHALT

- SAVE FREIGHT
- SAVE FUEL
- SAVE MONEY

PORTABLE AND PERMANENT FACTORIES ARE NOW OFFERED IN SIZES WITH CAPACITIES OF 1000 TO 6000 GALLONS PER HOUR

PROCESSES AND TECHNICAL SERVICE WITH ALL UNITS
K. E. McCONAUGHAY  **LAFAYETTE, INDIANA**



Colo. State Highway Dept. Photo
Where the snow had frozen to the pavement, Shumate's plows were able to get it off only to this extent.

Snow Storm Batters State's Road System

(Continued from preceding page)

and radio frequency channels were scarce for state highway departments.

Darkness fell, and with it his hopes. Then the telephone buzzed.

"It's Charlie, Doug."

Relieved beyond measure, Stewart growled, "What the hell do you think you are, a stunt pilot?"

"It was the only way to direct the thing," Shumate explained. "The storm kept getting worse all day. Wind is still high. I was up about 4 hours, and was able actually to look at 350 miles of highway. You can get a pretty good picture from up there."

"You can get into pretty good trouble up there, too," Stewart said.

Shumate ignored him. "Up there I could see how pieces of equipment could work to better advantage by moving a few miles. So I wrote penciled notes to the operators and dropped them. Got the equipment moved around where I wanted it."

Stewart grinned. "Charlie, I was going to call Mark Watrous and tell him that so far we haven't lost a man in this storm. So far as we know, no motorist has lost his life. But now I'm going to call him and tell him I've learned something new today!"

Victory at Last

The little desk calendar read "Thursday, November 14", 12 days after the

beginning of the storm. A tired man slumped in the Maintenance Superintendent's chair in Room 526, Colorado State Office Building.

The blockades of the previous Friday and Saturday were past. At daybreak on Sunday, November 10, the storm had begun to die. Men still worked on, with sheer nerve. Shops were full of damaged equipment. Cummings was busy getting new parts. But so far as Stewart knew, the job was almost finished.

In the morning paper, the Weather Bureau had reported this to be the worst storm in 57 years of Colorado history. Over and above regular maintenance charges, Stewart idly figured it had cost Division 4 about \$26,000.

The telephone jangled.

"Stewart speaking," said the tired man.

"It's Charlie, Doug. I guess we've got her whipped. Everything's two lanes wide now. We'll finish the shoulders before long."

"Good work, Charlie," Stewart said gently. Unspoken words were there—words Shumate felt and understood. Only writers dare mention them, for maintenance men never do. Both men knew, somehow, that here in this biggest battle they or their men had ever faced, another bond had been forged between Shumate, the patrolmen, the mechanics, laborers, and their boss in Denver. Something valuable had been added to the Department, something more precious than a new piece of equipment, sorely as that was needed.

As usual, when he is pleased with Shumate, Stewart turned to the subject of Shumate's balding head.

"Yes, Charlie, you can tell your grandchildren several years from now that you had snow right up in your hair in 1946—what hair you have left!"

"Oh, go to hell," said Shumate. "I've got a damn sight more hair than you have!"

Very pleased, Stewart picked up his overcoat. Tonight he would enjoy his dinner.

New Holland Sales Manager

The appointment of J. V. McKee as Southwestern District Sales Manager has been announced by the New Holland Mfg. Co. of Mountville, Pa. This division includes the states of Texas, New Mexico, Arkansas, Oklahoma, Western Tennessee, Mississippi, and Louisiana.

Spex for Small Tractor

A catalog describing its new HD-5 tractor has been issued by the Tractor Division of the Allis-Chalmers Mfg. Co., Milwaukee, Wis. Feature of Catalog No. MS-604-4612 is a complete page devoted to specifications for the HD-5.

Individual features of the unit are pictured; their money-saving characteristics are described. Photographs reproduced show the HD-5 being used with a bulldozer, end-loader, lugging a small scraper, and snaking logs.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 88.



DOWEL ALIGNMENT BEING CHECKED BY SPIRIT LEVEL

HIGHWAY DEPARTMENTS REQUIRE DOWEL ALIGNMENT CHECKED BEFORE CONCRETE PLACING.

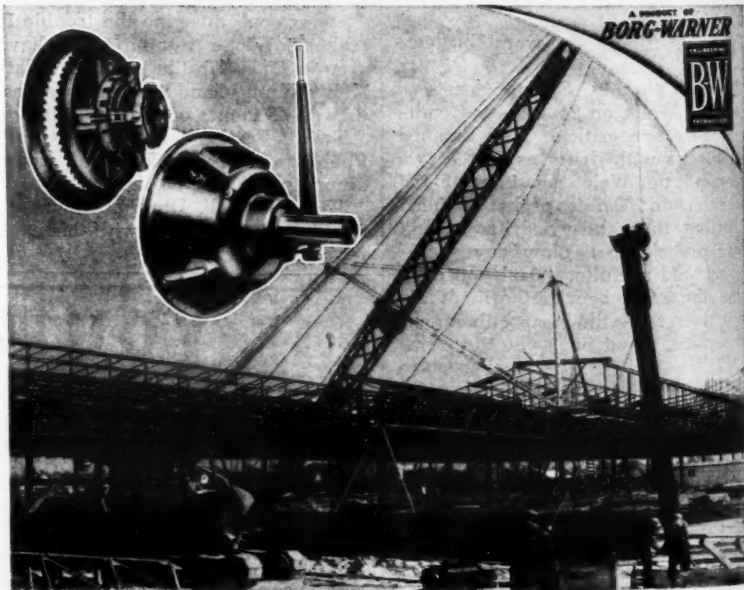
LACLEDE DOWEL SPACERS ALIGN DOWELS HORIZONTALLY, AND VERTICALLY ON ALL TYPES OF SUBGRADES AND MAINTAINS EXACT ALIGNMENT DURING CONCRETE POURING.

ELIMINATE COSTLY FIELD ADJUSTMENTS—USE LACLEDE DOWEL SPACERS.

LACLEDE STEEL COMPANY

ST. LOUIS, MISSOURI

ROCKFORD



POWER TAKE-OFFS

SELF CONTAINED UNIT

WIDE RANGE OF SIZES

CONSERVATIVE RATING

ROLLER BEARINGS

FINE ADJUSTMENT

ACCURATE BALANCE

S.A.E. DIMENSIONS

* ROCKFORD POWER TAKE-OFFS are available in standard sizes ranging from 210 foot pounds to 2100 foot pounds torque. Clutch sizes range from 8 to 14 inches double plate. These complete, self-contained units are suitable for heavy-duty gear-tooth application to current industrial gasoline and diesel engines.

Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

ROCKFORD CLUTCH DIVISION

314 Catherine Street, Rockford, Illinois, U.S.A.

Rip Thru Heavy Sawing Jobs...

New Mall Model 7 Chain Saw NOW AVAILABLE. Also Mall Bow Chain Saw and Mall 30" or 36" Circular Saw.



Mall CHAIN SAW

The speed with which the Mall Chain Saw cuts through heavy pilings, timbers, logs and planks—plus its ease of operation and accuracy—make it essential to construction crews and road, bridge and dock builders. It cuts at any angle... has a handle throttle and stallproof clutch for fingertip control... runs in any weather and uses very little fuel. Gasoline engine, electric and pneumatic models are available in cutting capacities ranging from 18 inches to 12 feet.

Write Contractors' Equipment Division for name of nearest distributor. Demonstrations can be arranged.

MALL TOOL COMPANY, 7743 South Chicago Ave., Chicago 19, Ill.

See Our Advertisement in The Saturday Evening Post September 20

Mall

PORTABLE POWER TOOLS



This big Model WB-22 White Super Power truck in the service of the Cleveland Municipal Airport is designed for efficient work in airport maintenance. In the background is one of the big 52-passenger DC-6's which will serve United Airlines.

Steam-Boiler Line For Asphalt Plants

Steam boilers ranging in capacity from 6 to 250 hp are made by The James Leffel & Co., Springfield, Ohio. They are recommended by the manufacturer for use with asphalt plants, pile drivers, and other steam-operated equipment.

The Leffel horizontal Scotch-type boilers can be fired with coal, oil, or gas. When coal is used, they can be hand-fired or fed by the specially designed Leffel underfeed stoker of the plunger or ram type.

These boilers come equipped with safety valve, blow-off valve with piping, water column, injector and valves. The piping is cut, threaded, and companion-marked for convenient reassembly in the field.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 13.

Power Tool Drives Anchor Studs, Rivets

An explosive-type power tool for driving anchor studs, rivets, and similar objects has been developed by the Powder Power Tool Corp., Box 1610, Ft. of S. W. Woods St., Portland, Ore. The Model 38 Drive-It weighs 7 pounds and delivers a 20-ton blow.

Power is developed from a small charge of special powder encased in a cartridge about the size of a 38-caliber pistol shell. The tool can be used for fastening signs to posts, either concrete or metal, fastening wooden sleepers to concrete, etc.

The Drive-It will not function unless forced vigorously against the work, and therefore cannot be used as a gun. It is further claimed that it cannot be discharged as the result of falling.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 12.

Ellipse-Drawing Aid

A set of five ellipses for draftsmen and engineers is made by The C-Thru Ruler Co., 827 Windsor St., Hartford, Conn. They are made of clear plastic, and each ellipse is marked in eighths of an inch up to 6 inches.

The set consists of a 15, 30, 35, 45, and 60-degree ellipse. Each template permits the drawing of any ellipse from 1/4 to 12 inches in diameter. In addition,

each ellipse has a proportional scale to check the proper degree template to use when the major and minor diameters are known.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 6.

All-Diesel Operations

A catalog describing its line of engines for all-diesel operations has been issued by the Witte Engine Works, Division of Oil Well Supply Co., 1600 Oakland Ave., Kansas City 3, Mo. Among other advantages claimed for this system of operation is the fact that only one fuel is required, maintenance is simplified, and costs are lowered.

Catalog No. 11 illustrates the complete diesel line of engines made by Witte, including the small engines and Dieselectric sets. Among the applications for these units is their use in diesel installations permitting an all-diesel operation. The engines range in

size from 4 to 12 hp and the Dieselectric sets have capacities from 3 to 10 kva, ac, and 2.5 to 8 kw, dc. Each unit in the line is discussed separately and specifications for each style are listed in tabular form for easy reference.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 83.

Engine Cleaning Aids

New aids for cleaning radiators, engine blocks, and other automotive parts have been announced by the Homestead Valve Mfg. Co., Coraopolis, Pa. One is a new type of flushing nozzle for use with the Hypressure Jenny steam cleaners; the other is the Clean-Tote portable cleaning basket and tray.

The flushing nozzle is said to fit all sizes of radiator hose, and to form a positive seal without the use of clamps. When back-flushing the radiator, the upper radiator hose is disconnected at the engine block, the Jenny nozzle is twisted into the lower radiator hose connection, and the other end of the steam-hose adapter is attached to the Jenny gun handle.

For cleaning the engine block, the nozzle is inserted in the radiator hose at the water outlet at the top of the engine block, which is then subjected to the steam-cleaning action of the Hypressure Jenny.

The Clean-Tote is a 4-wheel dolly for carrying machine and engine parts to the wash rack. Mounted on 4-inch full-swivel wheels, it is made in two models: a single unit consisting of a metal basket, and a double-deck style with a shallow metal tray and two wire-mesh cleaning baskets. Mesh and weave of the baskets are such that the materials are said to be cleaned rapidly

and efficiently without removal from the carrier.

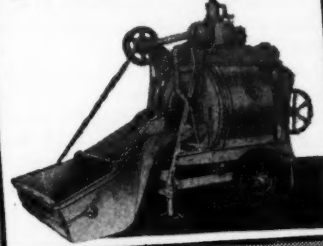
Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 11.

Concrete Researcher

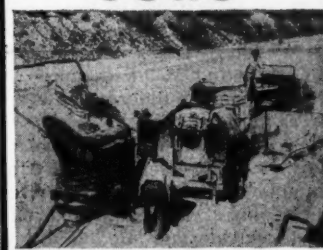
C. A. Willson has been named Research Engineer of the Committee on Reinforced Concrete Research, American Iron & Steel Institute, New York. He fills the vacancy created by the death of Roy Zippodt.

Look to
**FOR THE BEST
IN EQUIPMENT**

MIXERS
2 WHEEL-4 WHEEL



**JETCRETE
GUNS**



PUMPS
CENTRIFUGAL

DIAPHRAGM
AND HIGH
PRESSURE



Unit for unit—Feature for feature—Dollar for dollar—You can depend upon CMC Equipment to render "TOP" performance. See Your CMC Distributor, today, or write for catalog. Get the full details—then decide.

CONSTRUCTION MACHINERY CO.'S
WATERLOO, IOWA

Keep On

BUYING BONDS

★ ★ ★ ★

DON'T SKIMP!

4 POINTS

that lead to
LONG CANVAS WEAR

Ready for the long, hard life of extra duty is Flamefoil Canvas, a fabric treated by a patented* process that gives canvas 4 POINT PROTECTION and leads to extra safety and substantial savings in replacement costs of canvas equipment.

No. 1 is FLAMEPROOFING

A spark, a lighted match, a cigarette butt... they do not start Flamefoil Canvas blazing because it is protected by a patented* finish that gives the "cold shoulder" to flame.



No. 2 is MILDEWPROOFING

Mildew is a destroyer that is checked by Flamefoil Canvas finish. This process successfully takes the rotting "bite" out of canvas equipment in storage.



No. 3 is WEATHER RESISTANCE

The extremes of weather are no problem to Flamefoil Canvas. It is treated to "weather" all weather.



No. 4 is WATER REPELLENT

Drenching rains do not affect the protection of Flamefoil Canvas. It sheds water like a "duck's back".



Next time you buy be sure to specify Flamefoil Canvas for all your equipment. It's safer... it's more economical. See your canvas goods jobber or write direct.

*Manufactured under Patents Nos. 2,044,176 and 2,299,612. Others Pending.

FLAMEFOIL
PRODUCTS

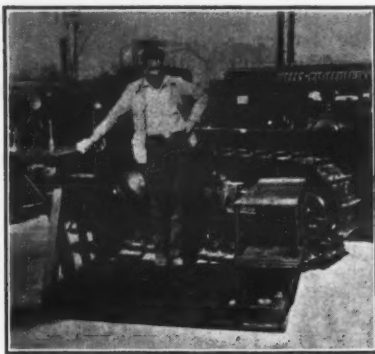
PHILADELPHIA TEXTILE FINISHERS
INCORPORATED

NORRISTOWN PENNSYLVANIA

Makers of: Flamefoil Canvas • Flamefoil Fabrix • Flamefoil Beauvon
and Flamecoat Canvas Finish



For
Over 70 Years
Builders of Fine
WHEEL BARROWS:
AMERICAN
STEEL SCRAPER CO.
Sidney, Ohio



This is the engine repair stand designed by R. L. Wilson, Service Manager of Southern Equipment & Tractor Co. It was built of scrap materials and is said to save 25 per cent in labor time on engine overhauls.

Engine Repair Stand

A repair stand credited with saving as much as 25 per cent in labor time on engine overhauls has been designed by R. L. Wilson, Service Manager of Southern Equipment & Tractor Co., Allis-Chalmers dealer at Monroe, La. It was built of scrap materials which included a gear box from the blade-lift mechanism of an old pull-type grader.

Attached to the shaft extending from the gear box is a plate drilled to accommodate any 3, 4, or 6-cylinder General Motors diesel engine block. To attach the engine block to this plate, the blower assembly is removed. Then the block is bolted to the plate for servicing, either assembly or disassembly. Shelves are provided for engine parts within easy reach of the mechanic. The stand is mounted on four casters for easy portability.

Describes Bulldozer Line

A folder describing its line of bulldozers has been issued by the Construction Machinery Division of the Southwest Welding & Mfg. Co., Alhambra, Calif. Bulletin CM-3 lists specifications for the Type BC bulldozer and the Type TC Trailbuilder.

The catalog shows by diagrams how weight and stresses are distributed throughout the track frame. It also lists other features claimed to provide fast and efficient dozing. Models are made to fit Allis-Chalmers, Caterpillar, International, and Cletrac tractors.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 62.

Hammermill Features Moving Breaker Plate

A line of hammermills which feature a continuously moving breaker plate is made by the Dixie Machinery Mfg. Co., 4208 Goodfellow Blvd., St. Louis 20, Mo.

The non-clog moving breaker plate is a patented feature of Dixie hammermills. It is designed to eliminate loss of production and trouble due to clogging when handling wet or sticky materials.

The Dixie Mogul Junior hammermill is available in four sizes to meet most contracting and quarry needs. Hopper openings vary from 15 x 20 to 40 x 20. Power is transmitted by pulley or flexible coupling mounted to the right of the feeding end, unless otherwise specified. Capacity is said to be from 8 to 10 tons per hour of asphalt rock for the small unit, and 20 to 35 for the large. Capacities are proportional for other materials. Size control is regulated by raising or lowering the breaker plate, or changing the size of the grate bars.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 16.

Slide-Rule Computer Of Breaking Strength

A slide-rule type of tool which computes breaking strength of specimens is free to engineers and engineering instructors who write giving name, organization, and position to W. C. Dillon & Co., Inc., 5410 W. Harrison St., Chicago 44, Ill.

The scale is set at the specimen size, and the breaking strength is read opposite the tensile strength in psi. The user can ascertain psi, how big to make a specimen, or what load he will need. One side of the computer is for rectangular specimens from 1/32 to 1/4 inch thick x 1/2 to 1 1/2 inches wide, and from 0 to 150,000-psi tensile strength. The reverse side covers circular specimens from 1/16 to 1-inch diameters, and from 0 to 100,000-psi tensile strength.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 4.

Rust-Proofing Paint

The availability of an anti-rust paint in aluminum as well as in black has been announced by Speco, Inc., 3142

Superior Ave., Cleveland, Ohio, maker of the Rustrem line of paints.

This paint can be applied right over rust without brushing or scraping, according to the manufacturer. It is said to penetrate the rust layer, rendering it inactive and sealing the surface against further rusting. Rustrem aluminum can

be painted over with a high-quality paint or enamel.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 38.

Invest in the future of America by buying U. S. Savings Bonds regularly.

Any Way You Look at 'em... STERLINGS EXCEL!



Plan NOW to Use these BETTER BARROWS as Soon as They are Available!

Carefully examine every detail of a Sterling Wheelbarrow—tray, braces, wheel, legs and handles. You'll find that Sterlings are engineered and built to take hard punishment over a long period of years. Right now, the demand for Sterlings exceeds the supply. But we are looking forward to the time when we can again take care of your normal barrow requirements.

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

Look for this Mark of STERLING Quality

Sterling

WHEELBARROWS

SYNTRON

CONSTRUCTION and MAINTENANCE TOOLS



"Gasoline Hammer"

PAVING BREAKERS

100% Self Contained

Busting Concrete.
Digging Clay, Shale,
Hardpan, etc.

Tamping, Backfill
and a host of other jobs



"Portable"

ELECTRIC HAMMERS

—for drilling, cutting, chipping concrete and masonry—scaling old paint and rust.



"Portable"

ELECTRIC DRILLS

3/16" to 1" capacity



External Concrete Form

VIBRATORS

Setting and compacting concrete in thin wall forms, pipe forms, standards, etc.

The industrial models can be applied to bins, hoppers and chutes to keep material free-flowing.



Save You Money and Time on hundreds of "nuisance" jobs.

Write for illustrated literature

SYNTRON CO.

227 Lexington

Homer City, Pa.

Extra SAFETY... Extra DURABILITY

...Extra OPERATING EASE...

WITH COFFING SAFETY-PULL HOISTS

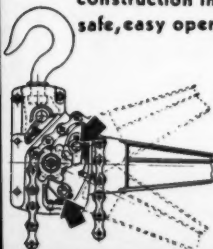
Check these features that give longer hoist life, greater ease of operation—

- Hooks of drop forged heat-treated steel
- Each model pre-tested to 100% overload
- Reversible handle permits operation in any position
- "Safety Load" handle—bends before other parts will break
- Coffing exclusive dual ratchet and pawl assembly for maximum safety
- Nine models in capacities from 1/4 to 15 tons



Moving Steel Inverts

Sturdy, simple pawl construction insures safe, easy operation.



Write for Bulletin RL-3

COFFING HOIST CO.
DANVILLE • ILLINOIS

RATCHET LEVER HOISTS • LOAD BINDERS • SPUR GEAR HOISTS • ELECTRIC HOISTS • DIFFERENTIAL HOISTS TROLLEYS



This photo of a spray boom for the application of weed killer shows part of the boom elevated for bank spraying. Designed by Dow Chemical Co. of Midland, Mich., it can be installed on a truck for about \$200, Dow estimates. The material for it is usually available in highway maintenance shops.

Shop-Built Sprayer Spreads Weed Killer

A shop-built spray boom for application of 2,4-D or other weed killers along highway right-of-ways has been designed by weed-control technicians of The Dow Chemical Co., Midland, Mich. It can be made from equipment usually found in highway maintenance shops and consists of pipe, nozzles, a turbine-type pump, and an air-cooled engine.

The central portion of the rig is mounted in a fixed position on a truck bumper. Sections extending beyond the width of the truck can be raised or lowered to any angle by manipulating lines from the cab. The section has a flexible end which facilitates spraying near posts, trees, and other obstacles. Flexibility is attained by a hose connection covered by a spring.

The boom is 20 feet long and has fan nozzles 16 inches apart. Spray elbows are attached to the pipe by 1/4-inch couplings sawed in half and welded on. The engine and pump are mounted on the rear of the truck adjacent to 55-gallon drums containing the spray material. An auxiliary hose with the proper spray nozzle attached can be hooked on the pump for spot spraying in inaccessible places.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 23.

Riveted Joints Studied

A study of the strength and behavior of riveted and bolted joints is being sponsored by the Engineering Founda-

tion, 29 W. 39th St., New York 18, N. Y. The research is being carried on at the University of Illinois and at Northwestern University.

Investigation will be made into the static and fatigue strength of joints in tension members with various rivet patterns; the static and fatigue strength of structural joints fabricated with hot-driven or cold-driven rivets, carbon-steel and alloy-steel bolts; and the relation between the properties of metals and the behavior of structural members.

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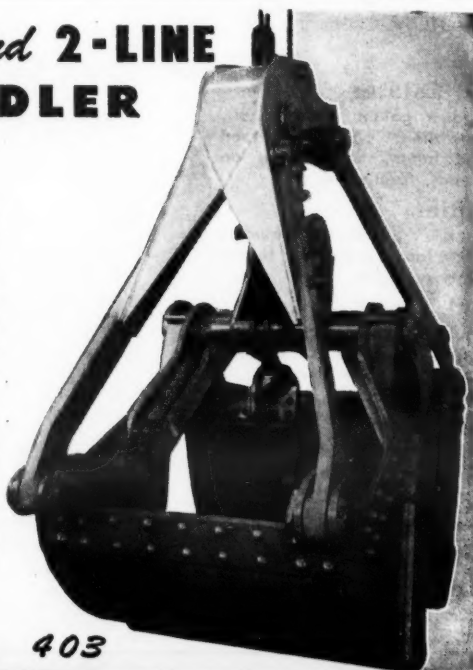
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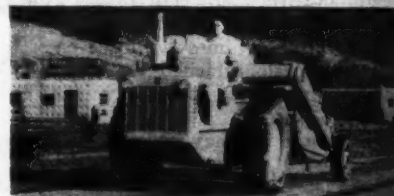
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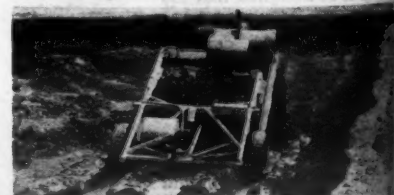
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